

GARCKE AND FELLS:
FACTORY ACCOUNTS

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GARCKE AND FELLS:
FACTORY ACCOUNTS
IN PRINCIPLE AND PRACTICE

A Handbook for Accountants and Manufacturers

WITH

APPENDICES ON THE NOMENCLATURE OF MACHINE DETAILS AND THE
RATING OF FACTORIES; AND TABLE FOR THE AMORTIZATION
OF LEASES

INCLUDING ALSO

*A GLOSSARY OF TERMS AND A LARGE NUMBER OF
SPECIMEN RULINGS*

Seventh Edition

Revised and brought up to date

WITH FOREWORD

BY

J. M. FELLS, C.B.E.

FELLOW OF THE SOCIETY OF INCORPORATED ACCOUNTANTS AND AUDITORS;
FELLOW OF THE INSTITUTE OF COST AND WORKS ACCOUNTANTS; FELLOW
OF THE ROYAL ECONOMIC SOCIETY, ETC.
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PREFACE TO THE SEVENTH EDITION.



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AS stated in the Preface to the first edition, this work is the first attempt to place before English readers a systematised statement of the principles relating to Factory Accounts, and of the methods by which those principles can be put into practice, and made to serve important purposes in the economy of manufacture. Our aim has been to show not only that as great a degree of accuracy can be attained in factory book-keeping as in commercial accounts, but that the books of a manufacturing business can scarcely be said to be complete and reliable unless supplemented by, and to a large extent based upon, the accounts special to a factory, and we mentioned that in attempting to supply a want which was known to exist, we but indicated the direction for useful work.

This path has been pursued by others as well as ourselves, and their helpful criticisms, commentaries, and our own continuous study of the subject, have enabled us to place before our readers a book which is of practical service under present-day conditions.

The demand for a further edition of this work is coincident with marked industrial unrest and development of dissatisfaction on the part of both employers and

employed with the existing relations between Capital and Labour.

We have considered whether, in view of probable economic changes in the established methods of remuneration of labour, any substantial variations are needed in the structure of this work, as apart from the revisions and additions of a technical character resulting from lengthened and wider experience.

Its main purpose, however, is of a technical character, and while hitherto it has seemed appropriate to make some references to economic and social questions in relation to the remuneration of labour and allocation of profits, we are of opinion that those questions have now become of such importance, and they are so interwoven with social and political conditions and considerations, that they do not admit of being dealt with except at greater length than would be practicable, and in a more controversial spirit than would be desirable, in a technical work. The concluding chapter of previous editions on "Methods of Remunerating Labour" has therefore been omitted in the present edition, but such portions of it as bear on the recording and analysis of payments under differing methods have been incorporated in other chapters.

We would, however, again record our opinion that the regrettable difference of view as to these matters between employers and employees prevents the attainment of the highest degree of efficiency in production, and is to the prejudice of all interests. As Professor Fawcett said more than a generation ago in relation to this matter,

all experience shows that there can be no hope of introducing more harmonious relations between them unless both are made to feel that they have an important and direct interest in the success of the work in which they are jointly engaged. Whatever the next stage in the evolution of industrial organisations may be, there can be little doubt that the tendency must be more and more to greater detail and accuracy in the preparation of accounts which form the basis of apportionment, as between partners or as between rival and contending interests.

Our view is that the principles enunciated in this book have a scientific basis, rendering them applicable to any condition of industrial organisation; that to demonstrate their economic results is peculiarly the province of the accountant; and to the attainment of that end a clear and complete system of Factory Accounts is essential.

In the "Foreword" to this edition we have thought it advisable to refer to the connection of cost accounting with industrial economics, and have indicated the directions in which the next advances toward scientific costing should tend, if the economic facts of life are to be made manifest in the most serviceable, clear, and complete manner.

Mr. Garcke desires to record his obligation to his friend and colleague, Mr. Fells, who has undertaken the work and responsibility of revising and extending the preceding edition of this book, and of writing the "Foreword."

“The counting-house of an accomplished merchant is a school of method wherein the great science may be learned of ranging particulars under generals, of bringing the different parts of a transaction together, and of showing at one view a long series of dealing and exchange.”

DR. JOHNSON, in *Preface to Rolt's "Dictionary of Commerce."*

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FACTORY ACCOUNTS:

THEIR PRINCIPLES AND PRACTICE.



FOREWORD.

DR. ALFRED MARSHALL in "Industry and Trade"—a study of industrial technique and business organisation, and of their influence on the conditions of various classes and nations—says that movements towards the general application of scientific methods in business management and administration were pioneered by studies of Cost Accounts, and in this connection makes a generous reference to the first appearance of Factory Accounts in 1887.

He mentions that the use of scientific analysis as an engine of business first attracted attention as the result of dissatisfaction with the customary methods of making up "Cost Accounts," that is, accounts which claim to show the total charges to be attributed to each particular class of product, as contrasted with cost accounting, by which the path of each element of material or labour is traced so as to show how much is embodied in the product, how much consumed in the process, and how much is lost.

He points out that the science of accounting has received a very high development during the last few generations, but that Accountants "even now often merely apply a few broad rules which represent broad results fairly

well, while making no pretence of being adapted closely to the special circumstances of each individual case."

Gradually, however, increasing attention has been paid to the actual extent to which each process of production is operated; how much use is made during the production of each class of plant; what it costs; what is its wear and tear; what is its consumption of power; and what is its liability to depreciation.

Similarly the charges to be set against any particular product on account of storage accommodation, and expenses of internal movement, are specially examined, for it is obvious that some goods ought to be charged at a low rate relatively to their prime costs, while to others a high rate should be applied, and that an hour's work of a machine for which there is but little appropriate work must be charged more highly than that of a machine which is seldom idle.

In 1887, when "Factory Accounts" first appeared, "Cost Accounting" was a neglected and non-recognised branch of Accountancy. To-day it is no longer necessary to urge the importance of the systematic and continuous ascertainment of the costs of production, and this advance in appreciation of "Cost Accounting" has arisen, in the main, from the prominence given to more or less empirical systems of "Costing" brought into operation during the war, not only in connection with the control by the State of a large number of industrial organisations in order to obtain requisites for the carrying on of war, munitions, food-stuffs, and other commodities, but also in connection with Governmental controls in relation to the maximum prices chargeable in the various branches of trade and for wholesale and retail transactions.

The methods of "Costing" adopted were in many respects suitable for the immediate purpose, but they were

not intended to make manifest from the systematic and scientific examination of every element of expenditure the various lessons to be learnt in the sphere of industrial economics, and they yielded only estimates of cost.

The same objections apply to recent suggestions that in factories where there is a great deal of repetition work, such expense as there may be in a Cost Accounting system might be avoided by the adoption of methods of Costing based on some figures specially compiled for comparison with standard efficiency costs founded on estimates.

In the Army a system of Cost Accounting is now being adopted which is not merely a series of Costings, but which constitutes a complete analysis of the whole of the expenditure incurred. The Select Committee on National Expenditure has reported most favourably on the method adopted, and has recommended that this system should be applied to the other spending departments of the State. The War Office was the first department of the Government to adopt a system of Cost Accounting, but before doing so referred the matter to a Committee who in their report, on which the Army Council decided to make the departure, stated *inter alia* :—

“Among the advantages arising from the use of accounts of a Costing type may be mentioned those arising from the regular and systematic bringing before the individuals who are ultimately responsible for expenditure, the various objects on which expenditure has been incurred, and the channels through which the expenditure has been made. The details of the account, although expressed only in money in the final account, reveal the commodities used and the services performed, which are eventually summed up in these terms. By the agency of Cost Accounts it is thus possible to consider the constituent elements of cost, and by these means to ascertain the differences which arise from varying conditions, and to consider methods by which, without

impairing efficiency, either in service or in production, economies may be effected. Cost Accounts also reveal the differences which arise from varying conditions as regards supply of commodities or remuneration of labour in different districts.

“A knowledge of all these varying factors is essential to good—that is, to efficient and economical—administration or management. Without such data, administration and management are either more or less haphazard, or are carried out on empirical lines. It is only through the study of comparative costs that progress in a commercial sense can be obtained.

“The systematic compilation of Cost Accounts has the further advantage of bringing about natural uniformity in the methods of accounting with such variations only as may be necessary, owing to the special circumstances of any locality or any special class of service or of product.

“Through Costing being undertaken as a distinct function in the accounting system, it is possible to obtain records of a detailed but general character, obviating the need of a large number of accounts being kept individually and for the information of some particular branch of administration without consideration of the relation of that particular branch to the whole undertaking. Cost accounting will thus lead to the prevention of the duplicating of account-keeping, and to the elimination of such accounts that are kept as do not of themselves serve any useful or informative purpose.”

Most branches of Science and Art possess a terminology in which words employed as “terms of art” have distinct and definite meanings, but the progress of Accountancy has been retarded by its chief terms and phrases having multiple and ambiguous meanings.

In the interpretation of terms of a technical or semi-technical character used in accounting, reference to a dictionary is of comparatively little use, for until those engaged in various pursuits have moulded the meaning of the terms or phrases they use, the compilers of

dictionaries are only able to give vague and general connotations to those terms.

The need in Accountancy for definition of terms so as to obtain a uniform and scientific phraseology is accentuated by the differing sense in which words used by accountants are employed by economists.

Amongst the subject-matters common to Economics and Accountancy are Capital, with its subdivisions of consumption, auxiliary, circulating, fixed and specialised. Income in money and net. Interest, profits, earnings of management, value, prime cost, supplementary and total cost, or cost of production. Distribution, exchange, wages, time and task earnings.

In economics, from the lax use of the term "Cost of Production," many misunderstandings have arisen and many barren controversies have taken place. It is said that Mill and other economists have used the term in two senses, sometimes to signify the difficulty of production and sometimes the total money outlay that has been incurred. Dr. Marshall amplifies its general definition in Economics by pointing out that as regards a particular business it always means money cost, and commonly includes a reasonable rate of profit, together with insurance against risk; whilst remuneration of the work of the owner of the business does not appear as a separate item in the accounts, but goes with interest on capital under the head of "Profits."

If there were co-ordination of the terms used in Economics and Accountancy, it should be possible to state the economic facts of industry in a manner so clear and succinct as to prevent the barren and often bitter controversy between the different interests in an industry as to what the facts really are.

Lack of precision in Accountancy terms has led to the

two words "Cost" and "Expenditure" being often used indiscriminately and as synonyms, and in some recent cases in the Railways and Canal Commission Court, little (if any) distinction has been drawn between them. In a case before that Court in 1916, which turned mainly on the use of the word "Cost" in an Act of Parliament, and the distinction to be drawn between that word and "Expenditure," it was pointed out in a minority judgment that these words were not convertible terms. The member of the Court who expressed this view stated that Expenditure was a debit factor which referred to outlay only, and was absolute, whilst Cost was a resultant and comprehensive factor, and was relative.

This minority judgment formed the basis of an application to the Court of Appeal to review the case and reverse the judgment of the majority in the Court below. But the higher Court, however, did not allow the application, the then Master of the Rolls, referring to a previous practice of the Railway and Canal Commission Court under an Act of 1894, expressly repudiating the view that the "cost of working" a railway was a "term of art."

It was thought that the majority judgment still left open the question whether, in ascertaining an increase in cost consequent upon increased rates of pay and shorter working hours, the result of altered modes and methods of working should not be taken into account.

This view did not, however, commend itself to the members of the Railway and Canal Commission Court, one member of the tribunal stating:—

"The proper method of arriving at the increased cost is to ascertain the cost of working the railway in 1913 quite regardless of the way in which it was worked in 1911, then to apply the 1911 scale of wages to the 1913 working, and the difference will give the increase which

the company can claim. This involves no comparison of either wages paid or the miles run or quantum of work done in some week in 1911 with wages and miles and work done in a week in 1913."

By its nature this mode is a comparatively simple and primitive one, ignoring altogether as it does the difference between Cost and Expenditure, and is thus open to very grave objection from a commercial and from an accounting point of view.

That "Cost" is a relative term is gradually winning recognition in accountancy circles, although it is sometimes applied somewhat loosely to an expenditure on constructional or other work to which no unit of cost can be applied, as, for instance, to the capital expenditure on communal undertakings which are not operated mainly for revenue purposes, but for purposes which are intended to promote the health and happiness of the community.

In usage the word "Cost" is often amplified into such terms as "cost of working," "cost of production," or is limited in meaning by the addition of qualifying words in such cases as "prime cost," "full cost," "actual cost," "direct cost," "true cost," "supplementary cost"; but none of these, or the other expressions used in Cost Accounts or in "Costings," are recognised "terms of art," and they have no strictly and generally accepted defined meaning.

The word "Cost" is often used as a generic phrase covering the aggregate of many cost ascertainties in the successive stages in manufacture or distribution through which the commodity has passed.

In practice, the methods of Cost Accounting must depend very largely not only on the technique of the particular trade and industry concerned, but also on the stage of production, distribution, or use at which the business interest of those, on whose behalf the ascertain-

ment is sought, ceases. The classification of the constituent elements of Cost is also dependent upon the determination of what information it is desired to obtain, and the particular purpose or purposes which it is hoped to subserve by the ascertainment of Cost at particular situations.

The ascertainment of Cost at various stages and under varying conditions renders it desirable to refer in any save an elementary ascertainment of Cost under primal conditions, to the costs of production, instead of, as has hitherto been the case, to cost of production. This more accurate phrase emphasises the fact that ultimate cost may be the product of an intermediate series of costs.

Under present-day economic conditions, to ensure the continuance of production not only now but in the future, regard has to be paid to all elements which enter into or have to be considered with regard to the costs of a commodity. Such costs range themselves under eight generic factors.

| Generic. | Illustrative. |
|------------------------|--|
| 1. Fixed Capital - - - | Acquired good-will, freeholds, and kindred objects. Formation expenditure. Replacement. |
| 2. Circulating - - - | Charges in connection with interest on stock manufactured or in process, stores, and working capital. |
| 3. Rights - - - | Royalties on patents, processes, charges in relation to permits, leases, wayleaves, and easements. |
| 4. Power - - - | Wages and other payments in respect of manual power performed by skilled and non-skilled workers, and for machine labour utilised or |

| Generic. | Illustrative. |
|--|--|
| 4. Power (<i>continued</i>) | directed by them. The cost of producing or purchasing fuel and other forms of energy such as coal, steam, electricity heat, water, gas, and oil. Remuneration paid to mental workers in salaries, fees, and emoluments in connection with research, directive and administrative activities. |
| 5. Materials - - - | Expenditure in producing, or the purchase price paid for, raw materials, or in the manufacture of parts. |
| 6. Auxiliary Services - | Payments or provisions in connection with insurance, publicity, marketing, transportation and other aids to production and distribution. |
| 7. State and Local Government Services | Taxes, rates, tolls, and charges in connection with police or other protection. Maintenance of roads, sanitation, or payments for other purposes for which State or municipal authorities levy charges. |
| 8. Contingency Services - | Risks not usually covered by insurance, including bad debts, disturbances due to war, panics, and strikes. Supersession of processes or patents as the result of competition or invention. Provision for the expansion, development, and improvement of a particular business to ensure the maintenance of its position relatively to other undertakings of a like character, or that it may be adopted to altered trade conditions. |

Whilst in economic science the unit in which cost of production is stated is nearly always that of a whole process, for administrative industrial purposes this unit has to be detailed into component parts which, in different kinds of undertakings, vary with the purposes for which the information is required, whether the ascertainment is for ordinary commercial and competitive purposes, or for technical purposes with a view to improving the product, increasing the output, or reducing the expenditure on production.

The need of care in the selection of the units of cost may, as a matter applicable in principle to other industries, be instanced in connection with the ascertainment of cost in railway working. Until recently in the majority of cases, and even at present in public inquiries, the unit adopted has been the train mile or the engine mile. The former recorded the number of miles travelled by a train, whilst the engine mile not only recorded the mileage run by the engine, but often included an allowance for a number of miles not actually run. In many cases the time during which engines were "standing" was calculated in mileage as if they had been running on a basis of 5 or 6 miles an hour.

Administrative economy in the working of a railway naturally consists in running as small a number of miles as is possible, consistently with doing the required work. Economies effected by the better loading of passenger coaches, wagons, or vans, or by the use of more powerful engines, or by running trains to which an increased number of vehicles were attached, were not only not reflected in costs ascertained on the basis of train miles run, but the result shown on such basis would lead to absolutely erroneous conclusions.

Thus if the train mile were taken as the unit of cost,

the anomaly arises that the more economically and efficiently the railway was worked, the greater would seem to be the cost ; that is to say, the saving in the number of miles run shows an increase of cost in the miles actually run. The adoption of a unit of cost based upon the number of tons carried one mile known as the ton-mile—that is quantity multiplied by distance hauled—obviates the anomaly referred to, so far as goods traffic is concerned.

In railway working, however, as in many other industries, the use of a single unit of cost does not enable the most effective and economical working to be carried out, and does not afford sufficiency of information, and many other units have to be employed.

Difference in the relative cost in making or producing the same or similar products under different conditions of time, place, material, parts, quantities or qualities, or by use of machinery of differing character and capacity, can only be ascertained by cost records being analysed on a qualitative as well as a quantitative basis.

Systems of Cost Accounting which permit of the ascertainment of cost in the terms of the required coefficients, can only result from close co-operation between the technicians of industry and trade, and the accountant. The results enable the accountant to supply the scientific economist and the practical man of business with those "economics of actuality" which enable the economist to survey the business world and surmise the economic tendencies of the times, and enable the practical man of business to apply the ascertained facts of his trade to the development of such modifications and improvements in material or method as may seem to be both desirable and possible.

When costs are ascertained through the co-operation of industrial technicians and accountants they can best be

expressed for other than purely financial purposes in algebraic formulæ, through which it is possible to translate general principles into terms of quantitative and qualitative analysis.

Cost Accounting, as Mr. Miles Taylor * has well pointed out, is the audit of activities, recording, analysing, comparing, interpreting, and demonstrating, dependable factors and tendencies, or, as put by Mr. Dick † in algebraic formulæ, Cost is expressed as a function of certain independent or interdependent variables, and from this function the consequences of changes in the variables can be predicted.

The methods of Cost Accounting to be employed to achieve these results have not found expression to any large extent as yet in practice, but more general recognition is now being given by economists, industrialists, and accountants to the desirability, in large undertakings, of Cost Accounting being carried out with more scientific accuracy than is as yet the case.

* "Business Organisation and Management." Pitman.

† "The Economics of Works Costs." John R. Dick, B.Sc., M.I.C.E.

CHAPTER I.

INTRODUCTORY.

WITH the rapid and continuous development of the modern Factory System there has arisen a need for regulations which would not have had application when production was carried on under a comparatively simple industrial organisation. By the aid of machinery the specialisation of labour is now carried to an extent which usually involves the passing of an article through as many hands or machines as there are processes in its production, and renders a further extension of routine and registration necessary. Under manual labour a simple form of accountancy sufficed to ascertain the cost of working up material. Guided by observation, and doubtless by some rudimentary account keeping, Walter de Henley, about the year 1240, with the object of increasing production, introduced into agriculture, the oldest of all the industries, the principle of leaving one field out of three fallow, and led the way to the recognition of the principle of rotation of crops as now practised in agriculture. Intricate accounting was not required in connection with the production of articles under a system of domestic or cottage industry, or under the early type of the Factory system dating from the time of Henry VII., when master manufacturers, weary of municipal and guild restrictions, organised little communities in country places solely for industrial purposes, and so arranged as to afford greater scope for the combination and division of labour.* Although the

**The modern
Factory
System.**

* "The Industrial History of England." Gibbins. London : Methuen.

divisions overlap, and examples of each system still survive, the predominant system in England up to the Norman Conquest was the Family system, followed by that of the Guild from about 1066 to 1450, the Domestic system from 1450 to 1750, and thereafter the Factory system. The industrial conditions of society have, however, been changed by the introduction of steam, of electric power, and by the continuously increasing extent to which it is found economical to expend large sums in the installation of machinery.

Under these conditions employers find it economical to adopt methods of supervision and of registration which, *prima facie*, make production more costly. The advantages of the saving of labour by the use of machinery, and of the combination of labour—of each workman confining himself to one process, and that always the one for which he is best fitted—are so great that the expenses of the necessary organisation are insignificant in comparison. Experience has shown that wherever the magnitude of the operations renders it practicable, every further extension of this principle of specialisation results, in spite of the increased expense of administration, in economic advantage.

The legislation with regard to factories and workshops, regulating the employment of children and women and their hours of labour, as well as providing for their health, education, and safety, the legal restrictions with regard to adult employees, the necessity of providing compensation for accidents arising out of, or in connection with, their employment, and regulations with regard to contributions to health and unemployment insurance, afford but some of the many indications of the complexity of the methods of organised production which now obtain. Although these changes in our industrial arrangements have already been fraught with many far-reaching consequences, both material and moral, they have been of comparatively recent growth.

“In the course of little more than a century the industrial framework of the whole civilised world has been radically reconstructed, and more changes have occurred in consequence, even more obvious and tangible changes—changes conspicuous upon the very face and features of the country itself—than for certainly the whole of the previous thirteen hundred years. But it is only quite recently that any endeavour has been made to trace the continuity of the various impulses, historical and economical, that have been concerned in the evolution of this particular method of production.”*

The Factory System: its history.

Under these circumstances, it is perhaps not surprising that systems of regulating the intricate affairs pertaining to a factory have until recently been determined entirely by empirical methods.

Although the term Factory Accounts may be familiar, and its meaning sufficiently evident to persons acquainted with manufacturing business, or experienced in any operations requiring records to be kept of materials, plant, wages, the use of machinery, and stock, yet it is not infrequently assumed, even by accountants, that the ordinary commercial method of book-keeping by double entry, without the special subsidiary books which every trade demands, suffices for every kind of business. The fundamental principles applicable to accounts necessarily hold good throughout all the branches of book-keeping; but many businesses involve, in addition to the mercantile transactions familiar to every one acquainted with the routine of an office or counting-house, multifarious and often extensive operations, of which the employment of labour and payment of wages, the purchase of raw

Misconception as to factory books.

General principles of book-keeping and particular trades.

* “Introduction to a History of the Factory System,” by R. Whately Cooke Taylor. London: Bentley.

materials and their conversion into manufactured commodities by the use of machinery, and the organisation and supervisory work in connection therewith, are but some of the outward manifestations; and for their proper registration special methods of book-keeping have to be devised.

**Require-
ments of a
manufactur-
ing business.** In the case of manufacturing firms the operations referred to call for careful analyses of expenditure, sometimes necessitating the storage of large quantities of various kinds of raw material, and the warehousing of goods to a considerable extent, as well as the manufacture, purchase, or erection, and gradual wearing out of valuable plant and tools. All this implies accurate adjustments of accounts. When large sums are paid in wages, it is essential, if the business is to be economically conducted, that the time during which the work-people are employed and the work upon which they are engaged should be accurately and sufficiently recorded. It is equally important that the material should be systematically charged to the work on which it is used, and the machinery cost ascertained. As regards the last-mentioned item of cost, it has been well pointed out by Professor Davisson * that labour cost without machinery is a different thing from labour cost with machinery, and that in machinery industry the expense of working the machine, as well as replacement charge, must be included in the real labour cost of production. It is only by means of systematic records

**Profit or
loss on indi-
vidual trans-
actions.** that leakage, waste, and fraud can be prevented, and that employers can know the cost of any article of their manufacture, and be able to determine accurately and scientifically, not merely approximately and by haphazard, the actual profit they make or loss they sustain, not only on the aggregate transactions during a given period, but also upon each individual

* "The Bargain Theory of Wages."

transaction.* In a business, the operations of which vary widely in character, this special knowledge as to the pecuniary result of a particular piece of work is of paramount importance, for it is not only conceivable, but very probable, that the presence or absence of this information may determine the policy to be pursued in accepting or rejecting large contracts, for whilst in general selling or contracting price is limited or determined by competition, it is obvious that the ultimate determining factor is the direct cost below which, in the absence of some equivalent advantage in other directions, a manufacturer or contractor will not knowingly supply for any length of time. A Federal Trade Commission was recently appointed in the United States. In their report (which led up to the issue by the Commission of a bulletin entitled "Fundamentals of a Cost System for Manufacturers," so that business men might realise that an accurate determination of costs is fundamentally related to business efficiency), the Commissioners express the view that "the purpose of conducting a business is to make money, and the only way to make money is to sell something for more than it costs. The first essential, then, is to know the cost. . . . Ignorance causes them (the manufacturers) to make unprofitable prices, which the

**Profitable
and un-
profitable
branches.**

* "In brief, Cost Accounts are the key to economy in manufacture, and are indispensable to the intelligent and economical management of a factory." ("Cost Accounts." W. Strachan. Stevens & Haynes.)

"A true costing system meant an accurate knowledge of productive and operative outlays, and while that was a truism, yet the fact remained that in many undertakings true costs were unknown. It was generally possible to show what was the actual cost of labour and material used on a particular piece of work, but that was only part of the cost. Then had to be added a proportion of machine and shop charges and general administration expenses, as well as interest on capital, so that the departmental manager . . . would be able properly to measure his cost with that of an outside manufacturer." Sir William Plender. *Accountant*, February 7, 1914.

manufacturer who does not know his cost is forced to meet." The merchant or middleman has endeavoured to buy from the manufacturer at the lowest price he could get him to accept, and has endeavoured to sell to the retailer or user at the highest price which competition with other manufacturers permitted. In the future, owing to changes in circumstances, the selling price of commodities will probably stand in more close and direct relation to cost of production than hitherto, and cost accounts will provide the bases for estimates or tenders. In the computation of this cost, allowance for the depreciation of wasting assets, must necessarily enter.

The lack of knowledge of cost often meant that manufacturers unwittingly have been selling below it, but have considered their price remunerative, because on the whole their business was profitable. The tendency in large organisations to combine the productive and distributive functions emphasises the need for "larger knowledge of cost in the productive department, larger knowledge of prices in the distributive department, larger knowledge even of foreign cost of production."* As Professor Sir W. J. Ashley has forcibly pointed out, whatever the price above or below cost at which it may be wise at any particular moment to sell, it is most desirable that the manufacturer should know what his goods do in fact cost him.† There is always a danger, when only the general result of a business is known, of departments or processes which are relatively unremunerative being unduly fostered, and of those which yield more than the average profit not receiving adequate attention. Employers should not, as is too frequently the case, be entirely dependent upon the periodical profit and

* H. John Falk, "On Changes in Trade Organisation." *Economic Journal*.

† Professor W. J. Ashley, "The Enlargement of Economics." *Economic Journal*, June 1908.

loss accounts for their knowledge as to the financial result of their transactions, but should at any time, and at any stage of manufacture, be able to ascertain, *pro tanto*, rapidly and reliably, the actual, and not merely the estimated, cost of production of any given article of their manufacture. They should also be able to determine, without the delay and labour of a survey or inventory, the quantity of stock and of raw material on hand, or of any particular item or part thereof. It would be discreditable to any cashier if his principal could not ascertain by a glance at the books the amount of cash in hand, but **Stock should be knowable without survey.** found it necessary to have the money counted; and there can be no reason why the same punctilious book-keeping should not be adopted in the case of goods. It is not too much to say that for a manufacturing or trading concern to be well organised, the storekeeper or warehouseman should be able to state, by referring to his Stores or Stock Ledgers, the actual quantities of any kind of material, or stock, on hand with the same facility and precision as the accountant can ascertain from the books the balance at the bankers, or the amount of securities in the safe. By means of detailed records of cost accurately compiled, and carefully considered and criticised, purchases of stores and expenditure of wages may be regulated, production facilitated and increased, economies introduced, and the business thereby placed on an improved competitive and profit-earning basis.

The advantages of systematic factory accounting are now receiving recognition in all industrial countries. Professor Laurence R. Dicksee, M.Com., F.C.A., has pointed out that there appears to be a "widespread belief that Cost Accounts were invented in the United States and introduced into this country by Sir S. H. Lever, K.C.B., when he came over to place himself at the disposal

of the Ministry of Munitions. The impression is as reliable as are most popular impressions, and it would not be worth combating, but for the fact that one never quite knows what may be the consequences hereafter of wrong ideas concerning the history of any important movement." As stated in the Preface (dated February 1887) to the first edition, the authors of this book believe that this was "the first attempt to place before English readers a systematised statement of the principles regulating Factory Accounts." Papers on various aspects of the matter had been read before various societies from time to time. One branch of the subject had been ably dealt with in a paper on "The Balance Sheets of Manufacturing Firms: Their Principles and Theories Viewed Analytically," read by its author, the late Mr. F. R. Goddard, Public Accountant of Newcastle, before a meeting of the Cleveland Institute of Engineers on January 16, 1872. This paper, through the courtesy of Mr. F. R. Miller, Chartered Accountant, of Manchester, the authors had an opportunity of perusing for the first time in 1916. Mr. A. Lowes Dickinson, C.P.A., F.C.A., in an address at the annual meeting of the American Association of Public Accountants, held at Atlantic City, New Jersey, in 1908, summarised the principal objects to be attained by a modern cost system as—

(1) To ascertain the cost of the same product at different periods in the same mill, or at the same periods in different mills, and so to remedy inequalities in cost by reducing all to the results shown by the best.

(2) By an accurate ascertainment of the cost of output to maintain running book inventories which will show at any time, without a physical inspection, how much of each class of materials, supplies, etc., is on hand, and so reducing

stocks and capital invested to the lowest state consistent with efficiency, and at the same time avoiding the delay, expense, and interruption to business consequent upon the old method of taking a complete physical inventory at a specific date in each year.

(3) The preparation of statistical information as to costs of parts, quantity, and variety of output, relative efficiency of different classes of labour, and relative costs of labour and material, between different mills and periods.

(4) The preparation of periodical statements of profit and loss in a condensed form, readily giving directors all material information as to the results of the business.

Mr. Dickinson considers the last as the least important of the objects aimed at, and that the cost of a system designed merely to produce periodical statements of profit and loss, without providing for the other and far more important objects enumerated under the first three headings, may be considered as money thrown away.

Professor Sir S. J. Chapman, M.A., M.Com., formerly Dean of the Faculty of Commerce at the Victoria University of Manchester, has pointed out that developments in Cost Accounting have rendered possible measurements which were not possible before, and that without these the scientific management of productive enterprises is not possible.*

These are only a few of the questions which present themselves in a cursory consideration of the nature of Factory Accounts. The subject of Cost admits of very varied treatment. In its consideration it has to be borne in mind that in the absence of an agreed definition, unless certain distinctive

**Prime cost
and depreciation.**

* Lecture delivered before the Manchester Chartered Accountants' Students' Society, October 26, 1914.

words are prefixed, different impressions may be conveyed to different minds. When the incidental charges and depreciation are of a more or less fixed character, it may be sufficient to know the cost of an article in wages and materials only; but if the use and wear and tear of plant and incidental expenses form a more direct element in the cost of production, and manufacturing cost has to be ascertained, it is highly desirable to apportion such items over the product or over the various operations or departments. The allocation of these charges thus presents many interesting problems, whilst the numerous methods of "writing off" and of determining the proper incidence of items such as deterioration of plant, tools, buildings, or similar assets, deserve the serious attention of owners of property, and tax to no mean degree the abilities of accountants, and their power of obtaining an absolutely accurate statement of affairs. In the widest sense Cost is all that part of the selling price which is not profit.

For the above-mentioned purposes, among others, systematised factory books are essential. The advantage of such books, clearly representing the actual state of affairs, is particularly evident when a business is for disposal; or is being converted from a private firm into a joint stock company, or when the whole or some part of the factory has been destroyed by fire, and it is necessary to prepare a claim on insurance companies. The figures in the commercial books then require to be substantiated in detail. There is little doubt

also that under a well-organised system of Factory Accounts, each employee should feel that he is contributing to the attainment of accurate records of costs; and that it is necessary that his account of the time he spends, and the material he uses, should be adequate and precise. This begets general

Incidental charges.

Sale of business, etc.

Moral effect of proper accounts upon employees.

confidence in the manner in which the accounts are kept, and on occasion of strikes or reduction of wages, or negotiations for fixing wages by means of a sliding scale based on selling prices—a principle adopted in many industries, notably the coal and iron trades, in the last quarter of the nineteenth century, but which has now fallen somewhat out of favour—employees have less hesitation in accepting the results shown by the books as correct and as based on fair principles.

It will be seen, even from this superficial summary, that it is not feasible to record accurately, and with requisite detail, in the ordinary commercial books, all the numerous entries necessary for the proper registration of the operations of a large manufacturing establishment. It is, moreover, essential that factory books should have columns for time spent in labour, for the hours machinery is in use, and for the weight or measurement of materials and the number of articles, in addition to cash columns for values; and these, which are an indispensable condition in factory books, would not serve any useful or practical purpose in commercial books, but would on the contrary mar their utility. The insufficiency of the commercial books alone to represent the transactions is conspicuously evident in the case of railway, gas,* and water companies, and large industrial undertakings. The factory books record the home trade and manufacture of the business, the commercial books its external transactions.

Factory books must not be considered, as is often the case, to be merely memoranda books, which are not

* The statutory form of accounts for Gas Companies is prescribed by Section 35 and Schedule B of the Gas Works Clauses Act of 1871, whilst that for Railways is prescribed by the Railway Returns and Accounts Act of 1911.

necessarily required to balance.* They should so assimilate to the books of the counting-house that the obvious advantage is not sacrificed of having a balance-sheet made up from the General Ledger which embraces, or verifies, or is in part verified by the balances of the ledgers and books kept in the stores and warehouses. No matter how far the subdivision of departments of an establishment be carried, or to whatever extent the principle of localising the book-keeping be applied, the concentration of the accounts—the merging of the departmental books and the verification of the manufacturing accounts in the General Ledger—should be kept constantly in view. There is not any special theoretical or practical difficulty in establishing a separate set of books for each and any of the departments, if it be not attempted to make the proper working of all dependent upon the proper working of each, or if no regard be had to the necessity of attaining the highest degree of efficiency and despatch with the minimum expense. On the other hand, to devise upon sound principles, and to carry out efficiently and economically, a system of accounts which necessitates the departmental book-keeping in a large establishment being subsidiary to one centre, is a science as well as an art. That a system is not economical which is inefficient is but a truism, and although we appreciate the importance and the necessity of minimising clerical labour, there is no occasion to lay particular stress upon this consideration, as the tendency is to dispense with services

Assimilation of all books.

Specialisation consistent with concentration.

Economy of clerical labour.

* “The Cost Accounting Books should never be considered as something separate and apart from the regular set of books of a concern; they should not be considered as inferior nor superior to the commercial and financial books, but they should in all cases be an integral part of the established system.”—Professor H. C. M. Vedder in *The Business World* on “Cost Accounting.”

which an adequate recognition of the value of sound book-keeping would probably show to be indispensable. Book-keepers and clerks being only indirectly engaged in the production of wealth, are often regarded as "unproductive" workers—using the expression not invidiously, but in a sense in which some economists employ it. The routine of the office is often limited by the number of clerks from time to time engaged, instead of the system of accounts and routine best adapted for the business being determined on, and a staff employed proportionate to the work to be done. The wisdom of initiating by the dismissal of one or more clerks the retrenchment which in times of depression may be called for, is not always apparent. The maintenance of a perfect organisation may enable economies to be practised, in comparison with which the whole cost of the office staff is insignificant.* It is well, therefore, to weigh carefully the *pro* and *con* before relaxing vigilance over expenditure and the salutary checks upon wastefulness and extravagance in manufacture which a good system of accounts affords. One of the disadvantages of insufficient records being kept is that book-keepers and clerks have often to spend much time in obtaining from foremen and workmen, after the event, information which should reach the counting-house in a regular and systematic manner. This is contrary to the principle that true economy is to be found in the specialisation of labour, and in clerks devoting themselves to clerical, and foremen and workmen

Division of work. * "The frequently expressed fear of increased clerical expense is largely imaginary. Good costing is not an expensive luxury. Any reasonable expense is found in practice to be fully compensated by many savings and economies and real gain in efficiency. Cases exist of a sound system being worked by fewer clerks than were required to handle a mass of worthless makeshifts."—"Cost Records, or Factory Accounting." John Mann, jun., M.A.C.A., "Encyclopædia of Accounting."

to more directly productive work. The expense of clerical work involved in Cost Accounting may often be much reduced by the use of mechanical aids such as Time Recorders and Calculagraphs. In many large organisations the term "Costing" is applied to the work performed by technical estimating departments, in which estimates but not records of costs are kept, and the monthly results are from time to time compared with the financial accounts, and as far as possible a reconciliation obtained between them, and the results of the estimates taken to be correct if, for purposes of control, the percentage of difference is negligible.

The task we have set ourselves is to explain the nature of factory books and the method of keeping them, and to show the operation whereby the subdivision and localisation of the accounts may be made consistent with the system of book-keeping by double-entry obtaining in the counting-house. We do not propose to enter upon a detailed explanation of the Ledger, Journal, and Cash Book, and of the subsidiary books which constitute the system of commercial accounts whether kept on the Loose Leaf, Card, Slip, or other systems, and whether mechanical devices such as Hollerith machines are or are not adopted.* The numerous excellent treatises extant on general book-keeping render this needless, and we shall assume on the part of our readers that acquaintance with the elements of the subject which is essential to a proper understanding of factory and other accounts. For this reason chiefly we do not think it necessary to follow the precedent of writers

* An interesting description of Book-keeping on the Slip and Card System is given in the lecture by E. E. Price, F.C.A., delivered to the Newcastle Chartered Accountants' Students' Society in 1906. The Hollerith machines are described in a series of articles on "Accountancy and Machinery," which appeared in *The Accountant* in January and February 1915.

on commercial book-keeping by tracing the entries of an imaginary firm through a series of model books. We do

Specimen rulings. not hesitate, however, to give specimen rulings of the books and forms suggested in these pages for adoption, and for facility of reference these specimens are numbered consecutively, as indeed should be the case in actual practice. In this connection

Exterior of books and distinguishable features. it may be well to point out that some regard should be had to the exterior of the books, an advantage being derivable from the books of each department or of each class being distinguishable by their bindings. Similarly papers of different colours should

General applicability of books. be used for the various forms suggested, while their rulings and headings may with advantage be printed in copyable ink. As in the majority of businesses the articles dealt in are reckoned in weight, we think it well to show the specimen rulings with weight columns. As it is not possible to show the specimen rulings of books applicable to every trade, we show only those of one class. Slight alterations in headings make these rulings applicable to trades using other measures, for the principles on which they are based are equally applicable to the liquid and mixing trades, such as those of

Diagrams. brewers, distillers, manufacturing chemists, and others, as well as to paper and other industries in which there is a continuous production of one kind of commodity, or to other enterprises where there are a number of processes or varying classes of products.* The principles

* "A clear perception of the similarities and dissimilarities is one of the great essentials to the practice of factory accounting. The fundamental principle is always the same, namely, the practice of making a record sufficiently full to constitute a clear accounting for the factory expenditure, and the object of the accounts is always the same, namely, to eliminate waste from the operations."—"Factory Accounting as Applied to Machine Shops." John Whitmore. *Journal of Accountancy*. New York.

enunciated are applicable to the ascertainment of all manufacturing costs, whether production is on a "unit" or multiple of a unit basis, on a "job" or separate cost for each product basis, or on a "standard" or "test" cost basis in which cost is ascertained with precision in a particular case, and the result taken as a basis for average costs. The relation of the various books to each other will be found further elucidated by the diagrams at the conclusions of Chapters II., III., IV., and VIII., showing the manner in which the books and forms assimilate to each other and converge into the Commercial Ledger.

Whilst not presuming to suggest that the forms and books of which specimen rulings are given apply universally and are incapable of modification either by subdivision or concentration, we believe that the principles underlying them are of general application,* and that the rulings will serve as useful examples, the cardinal principle to be observed being that the form of the records should be conducive to the easy allocation of expenditure to the object on behalf of which it was incurred.

In the next chapter we deal with the subject of Labour, defining the requisites of a proper wages system; and explaining, in as much detail as seems needful, the purpose of the books and the nature of the routine **Outline of contents.** which in our opinion should be adopted by manufacturers. It will then be necessary to explain the forms it is desirable to observe in connection with the purchase and consumption of materials for the purpose of manufacture, or the maintenance of buildings and the

* This belief has been proved to be well founded by the number of books that have been issued in recent years, applying these principles in the formulation in detail of cost systems applicable to special industries.

upkeep and renewing of machinery and plant. The question of Stores and the manner of dealing with the invoices for goods purchased will next demand our attention. In this connection we shall have occasion to explain the uses of the Stores Ledger and its relation to the subsidiary stores books and to the Commercial Ledger. Having considered the book-keeping and routine relating to the expenditure of labour and material for the purpose of the direct production of commodities, or for the working, maintenance, and renewal of machinery and plant whereby direct labour is saved or supplemented, we shall be in a position to consider the important books in which this expenditure is concentrated, analysed, and properly apportioned to the resultant objects. The books by means of which this is accomplished are the Cost Books. Their object is to enable a manufacturer to ascertain the cost to him of any given operation, and thus afford him some of the principal data for the conduct of his business. There are many systems of Prime Cost in vogue, but the writers who in dealing with book-keeping generally have touched upon the subject, are not agreed upon the definition of the term Prime Cost. In some instances the confusion of ideas and language has been carried so far as to render it necessary to speak of net and gross prime cost. Throughout these pages we take Prime Cost to mean, as shown in the Glossary, and as in fact the words imply, only the original or direct cost of an article in labour and material, including in labour, charges for the use of machinery when machine labour takes the place of manual labour. The cost of maintaining and working this machinery is one of the facts ascertained through the Cost Books. This cost, supplemented by a provision for the necessary replacement, has to be distributed over the purposes for

which it is incurred through the Plant Books recording the working of the machinery. Cost of production we define, as we have defined it since 1887, as the total expenditure incurred in the production of a commodity. The term "Factory Cost" is often used as synonymous with it.* In earlier editions of this work we called the books referred to the Prime Cost Books or Prime Cost Ledgers, but we made provision for the inclusion therein of machinery and other charges. In the previous edition the rearrangement of chapters consequent upon our more exhaustive consideration of the subject of charges for machinery, aided thereto as we have been by the efforts of those who have followed us in this field of inquiry, made it desirable to allude to those books as Cost Books or Cost Ledgers, and thereby avoid the misconception which an adherence to the original titles might involve.

The sale or distribution of manufactured commodities and the resultant "Marketing Costs" will next be dealt with, and at this point we think it well to draw a clear distinction between materials for manufacture and articles in the manufactured state. Until materials are converted into manufactured articles we speak of them as stores, but when so converted they are termed stock; and the book-keeping we recommend is based on this view. The accounts in the Cost Ledgers are debited with wages and materials spent in manufacture, with charges for use of machinery, and with the general expenses due to them, and are credited with the stock produced. The importance of this distinction

**Distinction
between
stores and
stock.**

* In a lecture delivered at the London School of Economics in 1918, Mr. A. E. Goodwin, Secretary of the Federation of Master Printers, stated that the printers were indebted to Mr. A. A. Austin Leigh for the definition of Cost as "The sum of all the expenses, direct or indirect, measured in the production of a given article." *Incorporated Accountant's Journal*, December 1918.

between stores and stock will be evident when the subject is dealt with in detail. The eighth chapter treats of the Stock Books, which though in some respects analogous in their functions to the Stores Books, are as distinct from them as is consistent with the principle of a system by which all the books of the establishment are required to merge into the Commercial Ledger, or to verify, or be verified by them.

This practically completes the outline of what constitutes the absolutely essential books in a system of Factory Accounts, but there are many other matters which have too important a bearing upon the subject of this work to admit of being passed over without reference. Such are the questions of surveys or inventories, and the numerous subsidiary books that, for the better understanding of the accounts, are required in the management of factories, and for the consideration of the economic effect of various methods of remunerating labour. These matters are dealt with in subsequent chapters. On the question of surveys or stocktaking, we do not presume, in view of the varying requirements of different trades, to do more than to offer some more or less obvious suggestions which have a general application.

The Appendices contain a reprint of a paper on the advantages derivable from the use of symbolic nomenclature for parts of machines, some notes on the law of rating of factories containing machinery, table for determining the amounts to be provided for the amortisation of leases, and a glossary of some of the terms used in this book.

CHAPTER II.

LABOUR.

THE initial step in the organisation of a factory must perforce be the adoption of a system by which each person employed at a rate of pay on a time scale shall receive payment for the exact time employed. Such a system should necessarily be one in which the workpeople have confidence, and in which they themselves co-operate.

A wages system the initiative in the organisation of a factory.

In the present chapter we describe the methods of recording the hours worked by each employee either automatically by means of mechanical "Time Recorders," or, in the case of small factories or workshops, which are still more numerous than the larger undertakings, by means of written time records. We show also how either of these records, through the instrumentality of the leading hand in the shop and of the time clerk, may be compared, checked, and if need arise, be corrected. By these means the possibility of an error either by over or under payment is reduced to a minimum, whilst fraud necessitates for its successful perpetration the connivance of the employee, the timekeeper, the leading hand of the shop in which such employee works, the time clerk, and of the clerk in the counting-house who makes up the Wages Book, and also of the cashier who pays the wages. Such collusion is very improbable, although not impossible.

Proper wages system minimises error. Summary of chapter.

Further, we show that, by means of a weekly return, it is impossible for anyone connected with either the counting-house or the factory to enter in the books wages for “dummy men.” This phrase is used to designate such a system of fraud as can only exist in a large undertaking

where it is possible for the foreman, the time-keeper, or the pay clerk, either singly or in conspiracy, to show a larger number of men employed than is actually the case.

Creation of dummy men prevented

By the use of the same return, fraud through the unauthorised alteration of the rates of pay of the work-

Weekly return of alteration rate.

people is prevented, and the authorised rate recorded for future reference. The regulation and recording of piecework prices, and the payment of piecework balances to those employees who have been paid during the continuance of piecework at time rates, is described; as are also the modes of controlling time made outside the factory and of preventing undue recourse to overtime.

It is then shown how deductions may, if required, be made from the wages of the employee, fines imposed for non-observance of rules, or other causes, for rent, or in

Sick and other funds.

respect of savings bank, sick, superannuation, or other funds; or of the amounts of adverse balances on piecework, of the deductions authorised by the Factory Acts, and of those obligatory under the National Health Insurance and Unemployment Acts, with regard to sickness and unemployment. Attention is called to the fact that the Wages Book may be correctly and concisely compiled from these various returns, and that it, in its turn, may, if thought well, be summarised for the use of the principal into a more condensed form.

The possibility with very little trouble of obtaining receipts from employees is dealt with, provision against the

misappropriation of unclaimed wages suggested, and consideration given to the mode of payment. The work of the time clerk in reference to the systematic allocation of the wages for the Cost Books, and of the timekeeper or other employee in reference to the records required by the Factory Acts, is explained. The necessity of compiling a list of addresses and of obtaining information as to the character of employees, as well as some miscellaneous matters, are incidentally dealt with.

**Receipts
for wages.
Duties of
time clerk.**

At the entrance to a factory, or to a section or sections of a factory, there is almost invariably found a small building, where the time of the entry and exit of every employee is registered by means either of automatic time recorders or clocks, or manually by a gate or timekeeper. As a general rule, the clocks make an automatic record of the time of one employee on a card or sheet, or make a record of the times of several employees on the same sheet. Before describing the working of these recorders and the routine in connection with the registration of the record slips, it will be convenient to describe the older method of time registration which still survives in many of the smaller factories, and in building and kindred industries. In these cases the time is obtained by each employee, on entering the factory, being required to pass the time office and mentioning the number which has been allotted to him at the commencement of his engagement, receiving from the timekeeper a metal check, tally, or other ticket, bearing his number, and taken from a board, on which the checks have previously been consecutively arranged. In some cases, in order to save time the employee is allowed to take his own check from the board.

**Time office
and time
recorders.**

On leaving the factory the employee deposits this check in a box placed outside the time office. The checks are sorted by the timekeeper, and can, in any case of doubt or dispute, be compared with the entries made by him in a book which is hereafter described. The checks having been again placed on the board, the process referred to is repeated each time the workpeople enter or leave the premises. In some cases separate check boards are used for, and a different series of numbers are allotted to, each department, and different sizes or shapes of checks are used for each shift.

Should a mess-room have been provided for the use of the employees there will not be any obstacle to the carrying out of the system if the mess-room is outside the timekeeper's lodge, but should it be situated inside the works, the checks can be issued from that point after meal hours.

After admitting the workpeople, the timekeeper proceeds to register their time. He sees by the presence or absence of checks on the board which employees are, or are not, in the factory. In a book so ruled as to show each employee's name and number, and each day of the week divided into four parts (for the time made before breakfast, where such time is worked, after breakfast, after dinner, and overtime, or such other divisions as may be most suitable for the business), the timekeeper enters the employees present. This is in most cases done by a vertical stroke, absence being denoted by a horizontal one. In some cases the four divisions of time above referred to are shown in the form of a square, thus \square ; or in cases where three divisions only are required, by means of a triangle, thus \triangle . In the square, the top stroke is supposed to represent the time before breakfast, the down stroke, right hand, that after breakfast, the base the time after dinner,

Mess-room.

**Method of
keeping time
books.**

rises automatically day by day, thus corresponding with the spacing on the card. The cards are not retained by the employees, but on entry are taken by them from numbered places or pocket slips on the one side of the clock, and are afterwards deposited in corresponding places on the other side. When leaving the factory the process is reversed. In the case of time clocks which record the time of several employees on one sheet, the employee on arrival or departure turns a key bearing his number in the clock once, as if winding it, thus ringing a bell which indicates that the time and date have been printed in the register the clock contains. The record slips are summarised in a Time Book, in the same way as the records obtained by checks, and it is desirable that they should be retained for purposes of reference over the ensuing pay day, in case of dispute. In cases where there are a number of shops, some a considerable distance from the main entrance, the clocks are placed at the entrance of the shops, thereby ensuring that the time recorded is that at which the employee commences work; but when men are working overtime or at odd times, the record is usually taken, as a measure of precaution, on the time clocks at the main entrance. An arrangement whereby in some recorders the arrivals at regulation times are registered in one colour and late arrivals in another, has in practice much to recommend it. These time records, apart from their utility in building up the pay-sheet, can also be utilised for costing purposes, and are specially serviceable in connection with jobbing costs. The "Rochester," "Dey," "Bundy," and the "Empire," or "Gledhill Brook," are among the time recorders at present most largely used.

If the employees are working in two or three shifts a separate Time Book may be used for each shift; or one

book may be so ruled as to take all three returns. It may be desirable at irregular intervals to change the **Double or treble shift.** timekeepers from one shift to another to lessen chances of collusion. The time of the work-people who are admitted into the works, or allowed to leave, at intervals between any of these divisions, may be shown by a red ink note of the number of minutes or hours' difference between the time at which they should have presented and did present themselves for admittance and departure, or, if the square and the triangle are adopted, by recognised shortenings of the strokes. The time at which employees are admitted into the works if late in arriving, will follow prescribed rules. No employee should be allowed to leave work at an irregular time unless provided with a permit or "pass out" note signed by his foreman, setting out the cause of such permission.

In some, and particularly in the larger, establishments, the functions of gatekeeper and timekeeper are quite distinct. The gatekeeper attends to the opening and closing of the gates, to the various callers thereat, and often records the times of the entry and exit of members of the staff and of visitors. So far as regards the time records, his duty consists in opening the gates at the prescribed times, seeing that each employee admitted receives or takes off the time board, or puts into the time box, as the case may be, one check only, closing the time box at the regulation hour, and forwarding it to the timekeeper. It will be seen that the general principle of recording the time is the same whether checks are given to the employees or taken by them from the time board or clock as they enter the works, and are deposited by them on leaving, or are deposited by them on entering and taken up on leaving the works.

In the building and the contracting industries in connection with the clearing of sites, and the erection of

buildings, a simple method of timekeeping is sometimes adopted in which the employee, who is given a number, simply repeats that number to the timekeeper when entering or leaving the premises, and the presence of the workmen is recorded by means of different coloured lines representing the various turns of duty which are drawn in the square representing the employee's number. The Time Book is ruled across with spaces for the ten primal units, with a side ruling for tens and multiples of ten. By these means a compact and diagrammatic record is obtained which when well kept seems to well serve the comparatively elementary time recording which such class of work necessitates.

If it be deemed desirable to have a record of the employees who periodically absent themselves, it may be kept in an Absentee Book ruled to show the names of those away on any particular day, and to bring out prominently the names of those who are most frequently absent. The same principle may be applied in recording, by means of a Time Lost Book, the names of those who are unpunctual. At each four-weekly or other period these absentee and time lost records should be summarised under names, trades, and times, and the foreman should record the steps taken in individual cases.

It may also be desirable to keep a similar record as to overtime (Specimen No. 4), and so prevent resort to it becoming chronic in the case of individuals, trades, or departments.

Having thus booked the time, entry by entry and day by day, the timekeeper at the conclusion of the week or fortnight, as the case may be, proceeds to cast across and enter in the column provided the total time made by the employee during such period, and then forwards the book to the office.

TIME BOOK.—SPECIMEN NO. 2.

| No. | Name. | Trade. | Wed. | Thurs. | Fri. | Sat. | Sun. | Mon. | Tues. | Total Hours. |
|-----|-------|--------|------|--------|------|------|------|------|-------|--------------|
| | | | △ | △ | △ | △ | △ | △ | △ | |

TIME BOOK.—SPECIMEN NO. 3.

| No. | Name. | Trade. | Wed. | Thurs. | Fri. | Sat. | Sun. | Mon. | Tues. | Total Hours. |
|-----|-------|--------|------|--------|------|------|------|------|-------|--------------|
| | | | □ | □ | □ | □ | □ | □ | □ | |

OVERTIME BOOK.—SPECIMEN NO. 4.

| Date. | Employé's No. | Time. | | Hours worked. | Allowance. | | | Total Time. | Remarks as to work. |
|-------|---------------|-------|----|---------------|------------|---|---------|-------------|---------------------|
| | | From | To | | ¼ | ½ | Double. | | |
| | | | | | | | | | |

A "time sheet," "working sheet," or "operation card," or some otherwise designated form of record being supplied to or provided for each employee, or a group

of employees, there is recorded on it, in consonance with the instructions received from the foreman, a record of how the day's time is spent, giving in two or three words, or in symbols, the nature of the work, the number of the order (if for plant or buildings, called the working order number; if for manufacturing any commodities, the manufacturing or stock order number), and the time spent thereon. In

Use of employee's time boards or record sheets.

TIME RECORD SHEET.—SPECIMEN No. 5.

Name _____ No. _____

| Day. | Nature of Work. | Order No. | Time. | | | |
|------|-----------------|-----------|-------------|-----------|-------------|-----------|
| | | | Ordinary. | | Over. | |
| | | | Piece Work. | Day Work. | Piece Work. | Day Work. |
| | | | | | | |

some cases the employees are supplied with sheets or cards, in book or portfolio form, but perforated for each day's use.

These time records, if used for more than one day's work, are perhaps most convenient if written on a form which can be easily gummed at one end to a board. On these forms or time slips it is well to have two divisions ruled—the one for a record of ordinary time, the other for overtime. The forms used for different shops or different classes of workmen may be distinguished by initial letters or signs; or, as previously suggested, by the use of paper or cards of different colours or tints.

In some cases when a card is used it is found convenient

to have it perforated so that each piece of work done is entered between the perforations, and the card split up and used in the same way as the time slips hereafter referred to. It is sometimes practicable to issue, or for employees to take, one of these cards for each operation from a rack near the foreman's desk in the shop, and by means of a Time Register to record automatically the time at which a certain order was commenced and finished, the employee placing the card in another rack when the completion of the order has been automatically recorded. Some of these Registers, such as the Calculagraph, automatically record the time spent on the work, as well as the time it was started and finished. The Calculagraph can be used in many ways and for many purposes. It is desirable, however, in cases in which it is used to arrange that the operator who thus keeps his own time, shall, when the piece of work on which he is engaged is completed, record his time in the presence of the foreman who would pass the work as being properly done. In works, the branches or departments of which are widely separated, the distribution of cost records or vouchers is much facilitated by the use of the Pick-up Mechanical Messenger, or two or more Calculagraphs can be used, located at points within easy distance of which the work is carried on.

The records should be initialled by the shop foreman or leading hand, and afterwards copied by the time clerk into a Time Allocation Book. In a business in which the work is highly specialised, and in which the employee is engaged on one piece or form of work only, and on that for some considerable time, it is possible, and may be found advantageous, to use these time slips as the direct sources of entry in the Cost Books * instead of the wages being analysed

**Time re-
cords, when
posted to
Prime Cost
Ledgers.**

* See Chapter IV.

in the manner described later. It is essential that in either case the total entries made in the Cost Books on account of wages should agree with the total wages expended.

The Time Allocation Book previously referred to is **Time Allocation Book.** cast up by the time clerk and forwarded, at the end of each payment period, to the office.

The two records of time made, viz., the Time Book (as prepared by the timekeeper) and the Time Allocation Book (as entered from the employee's own records, which are initialled by the leading hand), are, when sent to the office, compared, and in cases where differences arise, explanations obtained by the Wages Book clerk from the employee or the timekeeper. Should the explanation then given not be satisfactory, or should it not be received in time, it is incumbent on the clerk making up the Wages Book to see that the employee, pending the settlement of the question, is paid only for the lesser number of hours. In cases in which, owing to a breakdown, or inability of a leading hand or foreman immediately to start an employee on another order on completion of that on which he has been engaged, and there is a discrepancy between the time of the employee in the Time Book and in the Time Allocation Book, the time not profitably employed should be charged to a Waste account. In some cases the employee is provided, where time is lost through causes beyond his control, with a Lost Time Ticket, which is charged up to a Waste or a Lost Time account.

A suggested form for a Time Allocation Book, which may be ruled so as to take the records for a week, fortnight, or month, is shown (Specimen No. 6). Considerable economy in clerical work arises from considering the year to consist of 13 periods of 4 weeks each, so as to avoid the number of

TIME ALLOCATION BOOK.—SPECIMEN No. 6.

No. _____ Name _____ For _____ ending _____ 19 _____

| Days of Working Week. | Overtime. | | | Total Time. | Description of Work. | Order Nos. | Orders to be charged. |
|-----------------------|-----------|--------------|-----------------|-------------|----------------------|------------|-----------------------|
| | ½ Time. | Double Time. | Total Overtime. | | | | |
| | | | | | | | |
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apportionments necessary to give the results per calendar month. If this method is adopted, it is only at the beginning and end of the year that it is necessary to apportion wages for a different period than that shown by the Wages Book.

Where employees are engaged outside the factory or works for any considerable period, and are unable to

present themselves at the time office on commencing or finishing work, it is desirable to have an Out-works Time Record Sheet (Specimen No. 7), which the leading hand on the premises where the work is being carried on is asked to sign as a guarantee of the time being correctly recorded.

This Time Record serves as an authority to the time-keeper for the necessary entries in his book. In the margin of that book it is stated that the time was made outside the factory or works, the place and date being also shown. The time

Employees outside factory.

clerk will treat this Time Record Sheet as equivalent to the Time Slip or Board previously alluded to.

It is well to draw the special attention of the customer for whom work is being done outside the factory to the request that he will note in the "Remarks" column any overtime made by his order, as many seem either to

OUT-WORKS TIME RECORD SHEET.--SPECIMEN No. 7.

Workman's No. _____ Name _____

| Date 19 . | Day. | Where engaged. | Description of Work. | Order No. | From | | To | | Time Worked | Remarks. |
|--------------|------|-------------------|-------------------------|--------------|------|----|----|----|----------------|----------|
| | | | | | H. | M. | H. | M. | | |
| | | | | | | | | | | |

N.B.—In all cases where possible this sheet must be signed by the person for whom the work is being done, or his representative, and must be posted so as to reach the time clerk by _____ a.m., on _____ day.

(Reverse side.)

_____ 19
 To _____

We shall be obliged by your seeing that the other side of this Time Sheet is correctly filled up as regards the time of arriving at and leaving your premises; and, having done so, by your signing the same.

Should you desire overtime to be made please enter in the "Remarks" column that it is done at your request.

As these regulations are made to prevent mistakes and abuses, we trust they will have your kind attention.

ignore or be ignorant of the fact that the higher rate generally paid for overtime adds very considerably to the cost of the work and sometimes to the amount charged for it.

The economic aspects of overtime in relation to fixed capital are dealt with in a subsequent chapter. For our present purpose it suffices to say that if the employer desires to keep a check upon, and to reduce to a minimum, the overtime that is worked, he should require the foreman or leading hand to send to the office at the end of each period of payment a return of overtime made (Specimen No. 8), in addition to giving an "overtime slip," or authority to work overtime to an employee, to be handed to the timekeeper.

This return is initialled by the foreman or leading hand to show that the overtime has been sanctioned, and the clerk making up the Wages Book, to whom the return is handed, sees that no overtime other than that shown therein is allowed to pass through that book.

Instructions can be given either to the time clerk or to the Wages Book clerk, or to both, to prepare a statement showing the amount spent on overtime in excess of the amount that would have been paid had the same work been done at ordinary rates. Where the resort to overtime is on account of general pressure of work, and not on account of the pressing nature of a specific order, the allowance for overtime would seem more correctly chargeable to a general expenses account than to a particular order.

This return can simply show the amount paid in excess in each trade or to each individual, or it can be in a more complete form, as shown in Specimen Ruling No. 9. It is desirable that the extra cost of working overtime should be noted in the cost records against the various orders on which it is incurred.

PIECE-WORK RETURN.—SPECIMEN NO. 10.

Week ending _____ 19 .

Workman's Name _____ No. _____ Rate

Started on _____, 19 , at _____

_____ Foreman.

| Order No. | Reg. No. | Quantity. | Description of Work. | Rate. | £ | s. | d. |
|-----------|----------|-----------|----------------------|-------|---|----|----|
| | | | | | | | |

| | Date. | Hrs. | Date. | Hrs. | Date. | Hrs. | Date. | Hrs. | Overtime Allowances. |
|-----------|-------|------|-------|------|-------|------|-------|------|----------------------|
| Wednesday | | | | | | | | | |
| Thursday | | | | | | | | | |
| Friday | | | | | | | | | |
| Saturday | | | | | | | | | |
| Monday | | | | | | | | | |
| Tuesday | | | | | | | | | |

Last Piece-rate _____

Total time _____ at _____

Last percentage on Day-work _____

Balance _____

Percentage on Day-work _____

Signature of Workman _____

No. received as above _____

Signature of Piece-work Clerk _____

_____ Foreman.

Balance entered in Wages Book _____ 19 .

Exd. _____

Time Clerk.

In factories where, owing to the solidarity of labour, a large number of men and women are unable to commence, or fully carry out, their work unless a smaller number of men or women of a particular trade are present, it is sometimes found advisable to ensure the greater punctuality on the part of the smaller number by instituting a system of fines for late and of premiums for early attendance. Thus the man who was punctual would get his premium and wages for the time made, whilst the unpunctual man would be fined, besides losing pay for the time he was absent. In some cases a system of voluntary fines is resorted to, employees purchasing from the gatekeeper tickets recording the rule which has been broken, and the amount paid in connection therewith. The amount so contributed is often used at regular intervals for festive or charitable purposes. Care should be taken in connection with any system of fines instituted that the provisions of the Truck Acts are respected. The number of times each employee is unpunctual is reported to the office by the timekeeper, and can of course be checked from the Time Books and record slips, if thought necessary. The amount of premium or fine in each case would then be passed through the Wages Book.

The economic position in industry under pre-war, and still more so under post-war, conditions has led to increased advocacy of the application in some industries of methods of wages payments based on results. Considerable opposition was manifested toward the adoption of some of the earlier devised piecework systems, but the strength of the objection to the principle has been lessened by the modifications made in them, whereby the advantages of increased production have been more equitably shared between employers and employees. In many factories—boot and shoe, tailoring, coopering, cotton weaving, for

example—the majority of the employees are generally paid on piece wages and not on time rates. The employee is remunerated not on the basis of payment for time at a rate per hour, day, or week, but by a piecework wage or specified price for the production of a standard article, or the execution of a specific process, both under normal conditions, with such modifications of the standard, either by extras or deductions, as may correspond with specified variations of the standard product, with adjustments in the rates in case of defective materials or tools supplied by the employer.

In factories where employees engaged at time rates are employed on piecework, they should, when starting on it, be supplied with a Piecework Return Form (Specimen No. 10), on which is specified the nature of the work, the extent of the job, and the rate at which it is undertaken. The pieceworker on the completion of the work hands this sheet to a viewer, having entered upon it the number of hours spent on that particular job, for which he has been paid in ordinary course. The viewer records the result of his inspection in a viewing book, which has a carbon slip. This viewing report will contain much technical data of great value in the administration and management of the shops. The Return, having been modified or verified by the viewer of the work, is passed on to the time clerk, who checks the time entries made thereon from his Time Allocation Book, gives it monetary form, and enters in his Allocation Book the difference between the value of the output at piece rate and the amount already paid at time rate. Any balances favourable to the employee may be placed to his or her credit at the next piecework settlement, whilst adverse balances may

**Method of
recording
piecework.**

be deducted from the time pay, or from the next favourable balance.

In practice the latter course is preferable, as it prevents any question being raised by representatives of the trade union as to deduction from time pay reducing wages below the ordinary standard rate.

The provisions of the Factory Acts and of administrative orders authorised by the Home Secretary as to the publication of particulars of piecework rates, or as to check weighing, in certain trades have, of course, to be borne in mind.

In some cases it will probably be found impracticable, owing to the nature or pressure of other work, to keep an employee continuously on the work which he has taken at a piece rate. Under these circumstances the foreman or leading hand should at once notify the time clerk, in writing, that he has taken the employee off piecework and put him on time work. It may be found desirable for the foreman or leading hand to keep a Log Book, in which such interruptions to pieceworking are noted. In a large establishment this function might be discharged by the piecework viewer.

In any event it will be found very desirable to have a record of interruption to pieceworking, to which reference may, if necessary, be made at the time of settlement.

The time clerk, after duly examining and vouching the piecework returns, forwards the same to the office, where they can be rechecked in a general or detailed manner, if thought desirable.

Considerable advantage accrues from a Piecework Analysis or Register Book being compiled from these sheets. As indicated in Specimen No. 11, such a book would show the various rates at which work was undertaken, as also the percentage in which any kind of piecework is favour-

PIECE-WORK ANALYSIS BOOK.—SPECIMEN NO. II.

| Date. | Man's Name. | No. Article | W. No. | Articles No. of | Rate. | Amount. | Time occupied. | Rate. | Time made. | Amount of Balance. | Piece Work Percentage on Day Work. | Remarks. |
|-------|-------------|-------------|--------|-----------------|-------|---------|----------------|-------|------------|--------------------|------------------------------------|---------------------------------|
| | | | | | | | | | | | | 1st Price. |
| | | | | | | | | | | | | and Price, reduction of...each. |

able or unfavourable to either the employer or the employee; and it would serve as a record or check in fixing piecework rates.

From this source also comparisons between the percentage of piecework rates and day-work prices ruling in the various shops or departments can be obtained.

Having been checked, these piecework balances may be entered in the Wages Book (Specimen No. 14). The procedure applicable in the case of a pieceworker is also applicable when more than one employee

is concerned either as an assistant or as a member of a piecework gang. At the conclusion of the contract the remaining balance will be apportioned between the workers on the agreed basis, and their individual results credited to them in the wages sheets. Before passing from the subject of piecework it will be desirable to refer briefly to kindred methods of remuneration.

In the United States of America the opposition of the International Association of Machinists is by no means relaxed, and its official

Piecework Analysis Book.

Return of men engaged or left.

representative some time since declared that the Association will never be a willing party to the propagation of piecework. At present, in the States, more than in the United Kingdom, the original defects of the piecework system are being modified by the intensified or differential piece-rate system, and the premium plan of labour remuneration. The incentive to quicken production being diminished by the "dropping" of rates when piecework balances have been in the opinion of the employer too largely in favour of the employee, some employers have adopted the differential rate system, which "consists in offering for the same job a high price per piece if the work is done in the shortest possible time and in a perfect condition, and lower prices per piece for slow and imperfect work."* In these cases it is not usual to fix the rate primarily on the records which show the shortest time in which the same or similar work has been done, but on the basis of a calculation by a rate fixer as to the time that the work under ordinary and average conditions would occupy with provision for higher rate for shorter time, subject to there being no deterioration in quality. It is claimed for this system that it maximises output, by leaving to labour the extra reward of skill and application. It has stood the test of time in various works, among others those of the Midvale Steel Company of Philadelphia, where it was introduced by Mr. Fred W. Taylor, with whose name the system is often associated. A modification of this method was introduced by Mr. Gantt at the works of the Bethlehem Steel Co. Its distinctive characteristic is that if the worker does not reach the standard time, he is paid only 75 per cent. of normal wages for the excessive time, provided the bonus earned permits of the imposition of this penalty. The

* *Engineering Magazine.*

Gantt and Taylor methods are not now very extensively used. A system known as the Three Rate System of Compensation was initiated by Mr. Gillreth. The earnings were divided into three parts. The first was the day rate which the worker received whatever his efficiency. The second was the rate paid to a worker performing his work in exact accordance with the instruction card. The third was a rate paid when the work is done both in accordance with the instruction card and within the stipulated time. The premium plan, which has been successfully adopted in many works, was the result of much care and thought given by Mr. (now Sir) J. A. Halsey to the problem of reconciling the divergence of interest between employer and employed in quickening production. The basis of this plan, often described as the time share method, is the continuance of payment by time, modified by the expectation of a certain minimum product within that time, with a bonus or premium for lessened time, which is, of course, equivalent to increase of product. The direct labour gain to the employer consists of the difference between the premium and the wages cost saved. The division of the gain as between employer and employee presents, of course, some difficulty. In some cases a certain proportionate part of the gain is allotted to the employee. Sir J. A. Halsey himself adopts the principle of being liberal with the time rather than the premium rate. In some cases special grants are made to foremen, proportional to the number of men earning a bonus in the respective shops. In the Emerson Efficiency System as applied in the shops of the Santa Fé Railway, the characteristic features are the revision as part of the daily shop practice of any scheduled prices which appear to be too high or too low, and this without lessening the earning power of the worker. Another characteristic is the establishment of a general

monthly efficiency record covering the shop as a whole, and the employment instead of "speeders" and "task-setters" of instructors, who having determined as nearly as possible the standard time that a particular piece of work should take, show the employee how it should be worked out practically.

The premium plan is in the main identical with the system adopted in many factories and works in the United Kingdom under the name "gain-sharing," which has been defined as* "an arrangement under which a fixed or minimum wage is supplemented by a premium proportionate to the efficiency of the workman, so far as this exceeds a specified standard." Thus under the Progressive Rate method, introduced by Mr. Rowan, of Glasgow, the Halsey plan has been modified by the fraction of the gain receivable by the employee being varied so as to make the rate of earnings on the work (time wages plus premium) exceed the time wages rate by the same proportion as that which the saving in time effected bears to the standard time.† A further variation is to be found in the Reference Rate method, in which a total wages payment calculated upon a time allowance is fixed for a given quantity of work, and if the employee completes this in such time that his day-rate wages come to less than the Reference Rate, a share of the saving is allotted to him.‡

It will be found advantageous, and sometimes in large establishments indispensable, for a return or returns to

* "Profit-sharing and the Labour Question." By T. M. Bushell. London: Methuen.

† An interesting account of the variations of both systems, as adopted in the Imperial Dockyards and other establishments in Germany, is given in an article by Mr. F. D. Schloss on "Gain Sharing in Germany," in the *Economic Journal*.

‡ Interesting comparisons between the Time Share, the Progressive Rate, and Reference Rate methods are given by Mr. H. Culpin, A.S.A.A., in his lecture on Wages Systems.

be sent by the foreman at regular intervals, either to the clerk responsible for the Wages Book or to the principal, enumerating the names, trades, and rates of pay of employees who have been engaged since the date of the last return, and giving similar information concerning those who have resigned or been discharged. This return should also record any increases in the rates of pay, any transfers from one department to another, also the names of employees who are to be fined for neglect of duty or for any other cause, of those who are to receive premiums for some special reason, or who are on leave, or absent through illness or injury, but to whom wages or allowances are to be paid, and of those who are entitled to "black money" (or "dirty money" as it is often called), or other extras, with the respective amounts.

These returns should be duly entered in a Wages Rate **Wages Rate Book.** Book (Specimen No. 13). At any period the rate of pay entered in the Wages Book for all or any of the employees can be checked from this book.

WAGES ADVICE.—SPECIMEN NO. 12.

RETURN OF MEN ENGAGED, RESIGNED, DISCHARGED, PROMOTED, TRANSFERRED OR FINED, AND OF ALLOWANCES AND PREMIUMS,

at _____ Works, for the Week ending _____ 19

ENGAGED.

| No. | Name. | Occupation. | Rate. | Name and Address of last Employer. |
|-----|-------|-------------|-------|------------------------------------|
| | | | | |

[Specimen continued.]

WAGES ADVICE.—SPECIMEN NO. 12—(continued).

LEFT.

| No. | Name. | Occupation. | Remarks. |
|-----|-------|-------------|----------|
| | | | |

PROMOTED OR TRANSFERRED.

| No. | Name. | Occupation. | From | To | Rate. | | Remarks. |
|-----|-------|-------------|------|----|-------|----|----------|
| | | | | | From | To | |
| | | | | | | | |

FINED.

| No. | Name. | Occupation. | Amount. | Fined for |
|-----|-------|-------------|---------|-----------|
| | | | | |

[Specimen continued.]

WAGES ADVICE.—SPECIMEN NO. 12.—(continued).

ALLOWANCES AND PREMIUMS.

| No. | Name. | Occupation. | Amount. | | | Premium allowed for | Remarks. |
|-----|-------|-------------|---------|--|--|---------------------|----------|
| | | | | | | | |

Entered on Pay-sheet by _____

Signature _____

Unless a special book recording the length of the employee's service and of his or her varying rates of pay and other details is kept, the Wages Rate Book may be made to serve such purpose.

If a large number of employees follow the same trade, or if there is a recognised scale of rises on a period of employment or other basis, it may be well to supplement the Wages Advice (Specimen No. 12) by a return, sent into the counting-house on the first day of each month, showing the names and numbers of those to whom it is proposed during the month to grant increased pay. This form is almost identical with the Wages Rate Book (Specimen No. 13), with the exception that before the columns showing the successive advances there should be inserted two columns, the first showing the rate of pay in force, and the second the proposed rate. The "remarks" column should be used for stating the reasons for the advance. The sole utility of this form is that through its use the principal has only to settle the question of proposed increases once a month instead of once a week; and is thereby enabled more conveniently

**Successive
advances in
rates.**

WAGES RATE BOOK.—SPECIMEN NO. 13.

| No. | Name. | Trade. | Date of Engagement. | Rate. | Advance. | | Remarks and Date of leaving Service. |
|-----|-------|--------|---------------------|-------|----------|-------|--------------------------------------|
| | | | | | Date. | Rate. | |
| | | | | | | | |
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to make inquiries as to the character and capacity of any employee who is recommended for an increase of pay.

In order to have a further check on the engagement of additional employees, it is often arranged that the names of any men who have been taken on and whose engagement increases the number of hands in a particular trade, shall be entered in the Wages Book in a distinctively coloured ink, until the employer has seen, sanctioned, and initialled the entry on the Wages Advice recording the engagement.

It will be seen from the foregoing that the compilation of the Wages Book is not a difficult matter, and that, if ordinary care and attention are given to it, a clerical mistake should not occur; whilst the number of persons through whose hands the returns pass, each acting as a check on the others, should prevent speculation and fraud. The Wages Records being kept in detail minimises the number of questions which may arise in connection with the return which the employer has now to make of those

Compilation of Wages Book.

employees who are liable to Income Tax, and their earnings.

The specimen ruling of a Wages Book (No. 14) is, we venture to think, applicable in detail to most, and in general principle to all trades.

This specimen ruling shows columns for the entry of any stoppages or deductions for rent of houses, cottages, looms, frames, troughs, or machinery, where these belong to the employer and are hired to the employee, as also for fuel supplies, sick and provident societies, superannuation fund, deductions under the National Insurance Acts for Health and Unemployment contributions or other purposes. It must be remembered that under the "Truck Acts" no non-statutory stoppage or deduction can be made, unless there is a written agreement or request, signed by the employee, authorising such deduction or stoppage. All employees, therefore, who require such or other deductions to be made should be requested to sign a Stoppage Agreement Form, or Book, should the latter be the more convenient.

An exceedingly useful "Memorandum upon the Truck Acts," issued by the Home Office, and obtainable from His Majesty's printers, sets out the various purposes for which deductions are allowable, provided they are reasonable. The whole of the recommendations of the Report of the Departmental Committee on these Acts have not yet found legislative sanction, but they show the trend of probable legislation.

The Truck Acts, of course, do not prevent the practice of "subbing," whereby an employer sometimes permits an employee on occasions of misfortune or special expense to receive an advance of wages to a limited extent, such advance being without interest and repaid by deduction from the pay-bill each week until extinguished. In

pursuance of Board of Trade orders under Section 116 of the Factory and Workshop Act of 1901, particulars of work and wages have to be given to employees in certain trades.

If it is necessary to have a permanent record of the character of an employee, as evidenced by the fines imposed or the premiums granted, such information can be inserted in the Rate Book by means of additional columns, or special books arranged with reference to trades, as well as to individuals, might be used for this purpose.

Whether a separate banking account for wages be kept or not, necessitating the employer each week signing a cheque for the exact amount of the previous week's wages, so that the account may be kept in balance, he may find it desirable to have a summary of the Wages Book prepared (Specimen No. 15), showing the number of men and women employed in the various trades, the aggregate of their wages, their average rates of pay, etc. The Wages Book and Summaries of Wages should be filed for ready reference, so that, *inter alia*, if required for any purpose under the Employers' Liability or Workmen's Compensation Acts, or in connection with any insurance fund created by the employer, or any policy of insurance taken out by him, as a provision against claims under those Acts, the total amount paid during a certain period to any employee may be ascertained with precision and detail. War and post-war conditions have necessitated the keeping of the Wages Records in considerable detail, *e.g.*, in connection with the employment of disabled men, many insurance companies have entered into an undertaking with the Government to include the disabled in compensation policies on the same terms as able-bodied men, and require employers to keep a special Wages Book

containing the names of all disabled sailors, soldiers, and airmen employed by them, showing the wages of each separately.

Before passing from this branch of our subject it may be well to mention that the signatures of the pay clerk and another responsible person in whose presence the wages are paid are often considered sufficient evidence of payment. Pay Bills, if used, often contain places at foot for the signatures of foreman, the calculators and checkers of the amounts, of the cashier, and for a declaration by the pay clerk that the wages shown thereon have been paid by him at the place and on the date shown. This is sometimes supplemented by a further certificate in general form by the Manager, and in the cases of Limited Companies by the Secretary also. In some large undertakings it is not unusual to ask the Auditor to arrange occasional surprise visits to the pay tables whilst pays are in progress. Even in large establishments what is in reality a receipt for the wages paid may be obtained from each employee by a process which entails but little trouble. The time or pay clerk (as may be considered the more expedient) writes out on a slip of paper, ruled and printed for the purpose, the date, the employee's number, and the amount receivable. These forms can be distributed by the various foremen to their subordinates prior to the pay. Each employee presenting himself at the pay table hands in this "Pay-slip" to the pay clerk. These receipts can be compared with the Wages Book.

If instead of a Wages Book pay sheets, rolls, or bills are used, the receipts can be obtained on the original documents by distributing them in the different shops, but this would involve considerable labour as compared with the procedure first described. It is considered by

some that each receipt for wages above £2 should bear a receipt stamp. Practice in this respect varies considerably. In some cases receipts for amounts over £2 are not taken at all, in other cases receipts from all receiving more than that sum are taken on one sheet, and one receipt stamp used for the whole.

As previously pointed out, in some undertakings advantage arises from, and clerical labour is saved by, the wages being tabulated in four-weekly, instead of monthly periods, and the same principle is applied to other branches of expenditure. In such cases, as the thirteen four-weekly periods would not coincide with the calendar year, some adjustment would be necessary as regards broken periods at the beginning and end of the year.

In all cases where men do not present themselves at the pay table in ordinary course the pay clerk **Unclaimed Wages Book.** should make an entry in a book specially provided for that purpose, called Unclaimed or Unpaid Wages Book, showing the man's name, the date, and the amount of his pay (Specimen No. 16). The pay clerk should hand over wages unpaid to the cashier as soon as possible after the close of the pay, and the cashier should pay the amounts he has received on account of unpaid wages into the bank at regular periods.

A signature should be obtained in this book for the money of each employee who obtains his or her wages in any way other than at the pay table on the ordinary pay day.

By means of this book the principal can also see at once what wages have not been claimed, and can give instructions as to the disposal of such amounts as have been so long outstanding as to render their being claimed improbable. In many cases employees are advised of any amounts due to them which they have not claimed.

Where any considerable number of employees are unable, owing to their hours of work, to be at the pay table at the appointed time, there may be two or more **Payment of wages to deputy.** pays at suitable hours, or the employees so absent may empower one of their fellow-workers to receive wages on their behalf (Specimen No. 17).

UNCLAIMED WAGES BOOK.—SPECIMEN NO. 16.

| No. | Name. | Trade. | Amount. | For Week Ending. | Date Paid. | Received by | Instructions as to Disposal. |
|-----|-------|--------|---------|------------------|------------|-------------|------------------------------|
| | | | | | | | |

In cases in which employees are engaged permanently or temporarily outside the factory, a receipt for the wages remitted them may with equal ease be obtained by means of a form ruled and printed in copyable ink (Specimen No. 18). **Payment of wages to employees outside factory.**

The amount of expenses to be entered in the 7th column of Specimen No. 18 against the name of the employee are obtained from the Out-workers' Travelling and other expenses sheets, which are forwarded to the office by the official in charge of the out-works operations, by whom they should be certified. Each item of expense, such as railway fares, lodging money, or allowance for daily maintenance, "walking time," etc., should be separately shown.

As regards the method of paying wages, we may point out that in large establishments, prior to drawing the

amount from the bank, it is almost obligatory that the totals of each page of the Wages Book should be analysed so that such proportions of silver and copper may be obtained as will prevent the necessity for further change. This is done by means of a cash sheet (Specimen No. 19), which also serves as a check upon the addition of each page in the Wages Book, and by assigning to each page of that book the exact proportion of cash required to pay all the wages entered on that page, is further useful in localising mistakes in the process of counting out the money to be paid to each

Method of paying wages.

CASH SHEET.—SPECIMEN NO. 19.

| No. of Page. | Notes. | Sovereigns. | Half-Sovereigns. | Silver. | Copper. |
|--------------|--------|-------------|------------------|---------|---------|
| | | | | | |

employee, for if the sovereigns and half sovereigns, or as at present Treasury Notes for 20s. and 10s., are piled or placed in heaps of ten or twenty, and on the Wages Sheet a mark in ink or in pencil is placed where the respective heap should end, any mistake soon becomes apparent, and can be rectified by going over the counts to the last stopping place. The process of distributing wages is often by means of small tin boxes bearing the numbers by which the workpeople are known for time-taking and recording purposes, allocated under the systems described on page 34. In some cases the amount is placed in envelopes on which in printed spaces the employee's name, number,

and the make-up and amount of his wages are entered. In some cases envelopes either wholly or partially transparent are used, so that the contents of the envelope may be seen and counted, but some doubts have been expressed as to whether this method can usefully be employed where a large number of employees are engaged.

MONEY TRAY.—SPECIMEN No. 20.

| | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|-----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
| 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |

If tin boxes are used they are placed in trays constructed to hold 100 each, and arranged in ten squares (Specimen No. 20).

**Money
trays.**

The employees are called to the pay table by their numbers and in consecutive order, the duties of pay clerk being discharged by the cashier, or some official who has not been engaged in the process of counting the money, or in the compilation or checking of the Wages Book. The pay

giving certificates to the paying officer that he has identified each person to whom payment has been made. In cases in which owing to the absence of the employee payment could not be made, the paying officer leaves with the identification officer a left over wages note to be handed to the employee when available, who would thereafter be able to draw his wages. Insurances against misappropriation by cashiers and pay clerks can be effected with any of the well-known Guarantee Societies.

From the Time Allocation Book (Specimen No. 6) the time clerk should make an abstract weekly, fortnightly, four-weekly, or monthly as required, showing the various working or stock orders on which time has been spent. This summary or abstract should show against the various orders the cost of labour during that period in the respective departments or trades (Specimen No. 21).

The totals so compiled should agree with that in the Wages Book for the same period. This abstract of wages will form the basis of the debit to the Cost Ledger (see Chapter IV.) for labour expended upon the various operations carried on.

It is evident that the totals so entered on the Abstract of Wages Sheet may easily be traced back to the Time Allocation Book, and that any more detailed information that may be required can be promptly obtained.

In some cases it is desirable to post these Wages Abstracts in a Wages Journal under the respective Stock, Plant, or other orders (to be hereafter described), with cross divisions for various trades, and post the totals of these entries to the respective orders in the Cost Ledger, every quarter or half year, whichever may be considered the more serviceable. In such cases reference for details can, when desired, be made back from the Cost Ledger

**Wages ab-
stract for
purpose of
cost.**

to the Wages Journal and to the Wages Abstracts, with the records on which the latter is based.

Diagram of books and forms.

The diagram opposite page 72 will serve to show the relation of the various forms and books referred to in this chapter.

It remains to be observed, as the posting of the rules in conspicuous places in the works is not of itself sufficient to prove knowledge, that when a person who has been engaged presents himself at a factory for work, the timekeeper should obtain his signature to a book or form testifying that the rules of the factory have been duly read and noted. If any system of fines is adopted, the attention of the employee should be called thereto when engaged, and if agreed to by him a record of such consent should be made. In some cases a book containing the rules and regulations of the factory, a short description of the time system in use, the method of dealing with material, and the series of numbers or symbols used for Standing Orders, is supplied to skilled workmen on their joining the business. The timekeeper should also obtain the name and address of the last employer, and fill in and forward to the counting-house a character form for transmission to him. This form, which would ask for information as to the proposed employee's character and capacity, his rate of pay, and possibly other details of a personal nature, when returned filled in should, after consideration, be filed in a Character Book or on the Card Index or other system, so as to be easily available. The address of every employee should be taken when engaged, and should be entered in an Address Book. It is very desirable that periodically the whole of the employees should be asked for their addresses, and these when obtained compared with the existing entries. In cases in which workpeople may

Adhesion to factory rules by employees.

Character book.

Address book.

be required on urgent or pressing work it is especially desirable to know their correct addresses, and it may therefore be necessary to impose a fine for not notifying change of address. This information is also required in connection with the return which an employer has to make to the Assessor of Taxes of the names of all persons employed by him, and who are paid during the year an amount in excess of the sum for the time being fixed as the limit for total exemption from Income Tax.

The timekeeper should furthermore keep Registers, in accordance with the Factory Acts, of the children, young persons, and women employed in the factory, as well as a record of the cleansing and white-washing, etc., of the shops as required by those Acts. He should also inform some responsible person when any children are engaged, and should see that the necessary certificates as to education are produced, and that the certifying surgeon after making the examination required by the Act duly attests the Register.

We have not dealt with the appropriation of fines imposed, or the deductions on account of superannuation, sick, unemployment, or other funds, or with the occupation by employees of houses belonging to the firm, as these more correctly appertain to the books of the system of commercial accounts, with which it is not our province here to deal. In the last case, should an arrangement be made by which the workpeople, in consideration of not paying rent for the houses they occupy, receive less wages than they otherwise would, then the interest on the capital invested in the buildings forms an element in the cost of production, and should be debited to the Cost Ledger as a percentage upon the wages paid or in common with the indirect expenses to be referred to later. In practice, however, it is found

Register of women and children.

Houses belonging to firms occupied by workpeople.

WITH WAGES.

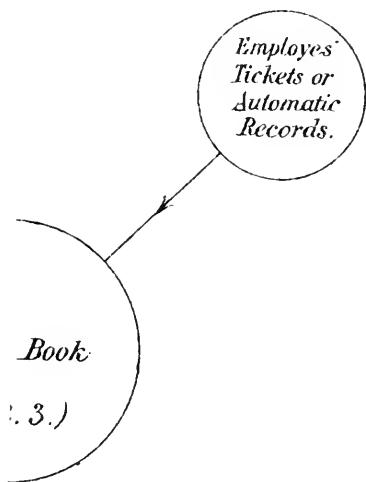
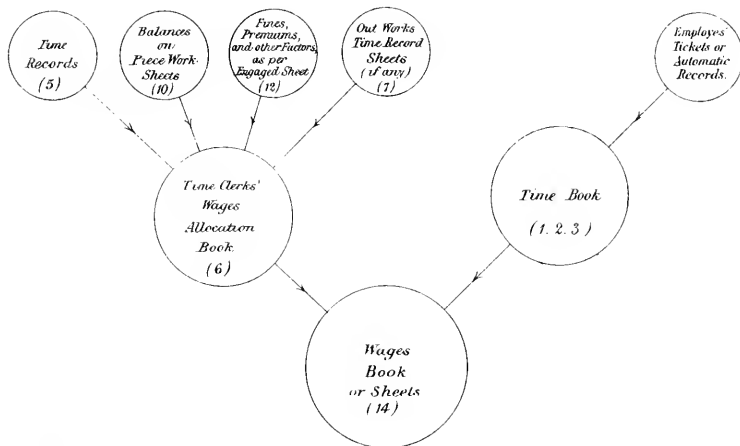


DIAGRAM I.

SHOWING THE RELATION OF THE BOOKS AND FORMS USED IN CONNECTION WITH WAGES.

(The numbers, where shown, correspond to the specimen rulings.)



that it is preferable to pay full wages, to collect the amount of the rent from the workpeople who occupy the houses, such amount being dealt with as revenue, and to enter the particulars of and amounts received from individual tenancies, with records of any premises "void" or unlet, weekly or quarterly on a Rent Roll, or in a Rents Receivable Book, ruled to show for each quarter the weekly or other receipts from each tenant, with columns for arrears brought and carried forward. These records are of special utility where the system of compounding for rates is adopted.

CHAPTER III.

STORES.

ONE of the first points to be considered in a review of the accounts of a manufacturing or trading concern is the **Purchase of materials.** question of the purchase of the materials or commodities which are essential to the carrying on of the business, whether the articles obtained are to be used as plant or for its maintenance, or are for the purpose of manufacturing, or are simply to be retailed. We aim, therefore, in this chapter, to show the wants to be provided for in order to insure economy in the purchase and consumption of material, and to suggest those forms by which an employer may assure himself that the raw materials of his trade are being bought in the cheapest market, and economically and properly used.

The initiative in the purchase of materials must necessarily be taken by those more directly engaged with the **Initiatory stage.** details of manufacture, such as the foreman or overlooker. The storekeeper, having found either that he has not a supply of the required or similar material, or that his stock is low and needs replenishing, enters a record of his requirements in a Stores Requisition Book, which can be periodically submitted to the principal, whose province it is to determine when, and in what quantity, it is desirable to purchase material.

If there are numerous branches the Requisition Book would be entered up in the counting-house, daily or weekly

as the exigencies of the business require, from the forms sent in by the heads of the several departments. These requisitions may be as shown in Specimen No. **Stores re-quisition.** 22. If made in duplicate the copy may, after the goods are ordered, be referred to the requisitioner, with any information as to the terms and conditions of the order which it is necessary for him to know. The Stores Requisition Book should contain columns for entering in the date of requisition, a description of the goods, the department or purpose for which they are required, and the name of the firm to whom it is proposed to give the order. Columns showing the price at which the goods are to be supplied, the quantity in stock, the last purchasing price, and the name of last supplier, and the maximum and minimum stocks—as these may from time to time have to be altered according to circumstances—may also be provided for the guidance of the principal. When the entries in the Requisition Book have been examined and allowed, an order for the articles would be issued. The advantage of all orders for the purchase of goods emanating from one centre, instead of each department being able to supply its own individual needs, is that it permits the principal of the business not only to control in a very large degree the character and amount of the consumption, but he, or the buyer or the purchasing department, as the case may be, can “feel the market,” either by obtaining quotations or otherwise, and can thus contract far more favourably for the supply of the goods required than would otherwise be the case. Even if by this concentration a little delay in obtaining supplies is caused, it need not lead to inconvenience, as the requisitions can, in the majority of cases, very well be made in anticipation of the demand arising.

Should the principal determine to contract for the supply of certain goods over a period of time, it is desirable that

the invitation-to-tender forms issued by him should be uniform, and should state clearly and concisely the conditions on which the goods will be purchased and paid for. This form should also state when and where the patterns or samples may be seen, the date on which tenders

STORES REQUISITION.—SPECIMEN NO. 22.

No. _____ Department. 19 .

A supply of the undermentioned articles is required.

| Article. | Purpose | Date of last supply. | Quantity last supplied. | By whom supplied. | Price of last supply. | Present Stock and Remarks with Maximum and Minimum Stocks. |
|----------|---------|----------------------|-------------------------|-------------------|-----------------------|--|
| | | | | | | |

STORES REQUISITION BOOK.—SPECIMEN NO. 23.

| Date of requisition. | Goods re-quired. | Wanted by | Pur-pose. | To be ordered from | Order. | | Invoice. | | Remarks. Max. Stocks. Min. Stocks. |
|----------------------|------------------|-----------|-----------|--------------------|--------|--------|----------|-------|------------------------------------|
| | | | | | No. | Price. | Amount. | Date. | |
| | | | | | | | | | |

will be received and opened, and the usual notification that the proposing purchaser does not bind himself to accept the lowest or any tender. The Prevention of Corruption Act has done much to safeguard the rights and interests of employers against malversation, and it is advisable that all

employees should be as well acquainted with its provisions as the employer.

It is desirable that a Stores Contract Register be kept, that particulars of each contract should be entered therein, with the date of the various supplies, so that the position under the contract may be rapidly and easily ascertained.

If the contract or order is to supply to pattern or sample, the storekeeper should keep a Pattern or Samples Register, showing dates on which duplicates (which usually bear some identifying seal or mark) were forwarded or handed to suppliers, and a record of the place of deposit of the originals.

Specimen ruling No. 23 shows the headings of a Stores Requisition Book, which will probably suffice in most cases, but the other headings referred to would also be found useful.

The date and amount of the invoice can, of course, only be inserted at the conclusion of the transaction and when the goods are delivered, but their entry gives a useful record, and is valuable as a check.

It having been decided to order the material requisitioned, there should be made out from such requisitions

Order form. the order to the vendors. These orders should specify the conditions on which the goods are ordered as to delivery, carriage and packing, the route by which they are to be sent, the place and time at which they will be received, the mode of testing quality, the terms and date of payment, including the cash discount, if any, which will be deducted, and instructions as to acknowledging receipt of order, sending advice notes, invoices, and statements of account. In some cases where material is ordered specially or entirely for one job the order to the suppliers contains the instruction that the goods supplied are to be marked with the working order.

If there is any arrangement as to payment of penalty in case of delay in delivery, or defects in manufacture, the

clause or condition of the order should state that it is as by way of liquidated damages. In this connection it may be pointed out that it is desirable that those concerned with the ordering, accepting, or forwarding of material or finished products, should have some general acquaintance with the provisions of the Sale of Goods Act and with the law relating to carriers.

In some cases, contracts are entered into for supplies extending over a period, and the conditions are either embodied in correspondence, or preferably in the clauses of a formal contract. These contracts should be summarised in the Stores Contracts Register previously referred to. It is desirable that orders for deliveries of portions of these contract supplies should be made on the ordinary order forms, any necessary alterations being made thereon. In other respects, this mode permits of the same procedure being observed with contracts as with orders.

In the case of purchases of small value through Petty Cash, the cashier should advise the storekeeper monthly as to nature, quantities, and values of goods so purchased, the storekeeper should nominally pass an order for the goods, as if the cashier were an independent supplier, and the debits to the working orders would thus find their way into the books in the usual manner.

In some cases orders to supply goods may be contained in a letter or a series of letters, or in some cases of emergency goods may be ordered orally. In these instances it is desirable for reference and other purposes, as well as for facilitating dealing with the invoices, that *pro forma* orders should be sent to the suppliers, even if it is only possible, to do so after the goods have been delivered.

The order forms should, for reference, be numbered consecutively by the ordering department, and subsidiary references, by initial letters, symbols, or numbers, might

appear as numerators over the order number, or be interwoven therein, so that, through the order number, the department or person requisitioning, with the number of the requisition, can be clearly traced, and a great deal of inter-reference thereby be saved. The use of the back of the order form for invoicing purposes will be referred to when dealing with the procedure as to invoices.

It is sometimes considered that if the order forms have counterfoils, are press-copied or are manifolded by means of carbon sheets, and signed by a responsible person, the necessity for a Requisition Book is not very apparent. It will be found, however, in practice that while the work required to keep such a book is but slight, the facilities it affords for reference, and for noting the orders when executed, present many advantages. It is a question of the relative value of labour, and it is often more economical for a clerk to give regularly a portion of his time to certain work than for an employer to have occasionally to give a few minutes. If it is thought desirable to send copies of the orders issued to several departments, the necessary number of copies can be made in one operation by the use of carbon sheets.

The practice of forwarding advice notes with the goods is sometimes objected to by the purchasers as convenient, but unsafe, as tending to lead the storekeeper to return the advice note to the office as correct, without having made the necessary count or examination, and as an alternative it is suggested that the storekeeper should be supplied with a duplicate copy of the order, but on which the quantity ordered and the price are left blank, so that the storekeeper is bound to make a count. If, however, the Factory and Cost Books are properly and regularly kept, such lapses on the part of the storekeeper would soon reveal themselves and lead to correction. In some cases the orders

are in quintuplicate, the original being forwarded to the suppliers, a copy being sent to the costs branch, the store-keeper, the correspondence branch respectively, and one remaining with the buying department.

To avoid confusion it is often considered that all goods received should pass through the Stores Account, even if ordered for some particular work only, and not be charged, as is sometimes the case, to the work as direct goods.

Different systems obtain in different trades of dealing with the registration of invoices for goods supplied. Many firms stipulate for invoices in duplicate or triplicate to be distributed among, and dealt with by, the departments concerned. In some instances the order forms sent by the purchasers are printed and ruled on the back, so that that portion of the order form can also be used by the suppliers for invoicing purposes. This is a matter of considerable convenience to the purchasers, and if the back is ruled and printed in copyable ink, the use of the form can be deprived of any disadvantages to the suppliers. In almost all cases it is stipulated that an advice note of the dispatch of the goods should be sent to the officer in charge at the place to which the goods are sent, and it is generally desirable that the supplier should be requested to send a duplicate to the ordering department. In such cases the officer in charge may be requested to send to the head office daily a Stores Received Form ruled to show the species of goods, from whom and whence they have been received, the purchase order number, mode of delivery, carriage charges, number and class of packages, the weight, measurement, number, remarks as to condition, location in store, and having a column for the initials of the clerk at the head office, who compares this Stores Received Form with the invoice, and makes on each the necessary numerical cross references to the other.

Carbon copies of this return can also usefully be sent to the departmental chiefs who are concerned. Among the advantages of this method may be mentioned the retention of the original invoice at the head office, with the consequently lessened liability to loss, or delay, and, in cases where it is desirable, the easier restriction of information as to price or other conditions of the order. A

INVOICE REGISTER BOOK.—SPECIMEN No. 24.

| No. of Invoice. | From whom received. | Nos. of Orders. | Folio in Requisition Book. | Amount of Invoice. | | | Date sent to Storekeeper. | Date returned by Storekeeper. | Date handed to Bought Day Book clerk. |
|-----------------|---------------------|-----------------|----------------------------|--------------------|--|--|---------------------------|-------------------------------|---------------------------------------|
| | | | | | | | | | |
| | | | | | | | | | |

STORES RECEIVED BOOK.—SPECIMEN No. 25.

| Date. | No. of Invoice. | Supplied by | Articles. | Dimensions. | No. | Weight. | | | Price. | Amount. | Account to be charged. | Stores Ledger folio. |
|-------|-----------------|-------------|-----------|-------------|-----|---------|------|------|--------|---------|------------------------|----------------------|
| | | | | | | Cwts. | Qrs. | Lbs. | | | | |
| | | | | | | | | | | | | |

system much in vogue is that of making one invoice perform all functions. When this plan is adopted the vendor of the goods should be requested to send the invoice direct to the counting-house, notwithstanding that in pursuance of directions the goods are delivered at the works or elsewhere accompanied by a delivery note. Immediately on receipt of the invoice it should be examined with the view

of ascertaining whether the general conditions of the order have been complied with, and the price charged is as stipulated. If the primary request to quote the order number is not complied with it is desirable, without further examination, to return the invoice to the suppliers forthwith, so as to prevent a recurrence. Should the invoice be found correct, it should be numbered and sent to the storekeeper, foreman, or other person to whom the goods have been delivered, for him to certify as to the correctness or otherwise of their quantity and quality; and it can also be signed by the works manager as to quality if an additional check is thought necessary. After comparison the counter-foil or copy of the order should be so marked or ticked as to show that the invoice has been received. It may be advisable, if the number of invoices is large, to enter them on receipt in a Register Book (Specimen No. 24). The procedure is for the storekeeper to enter the invoice in a **Stores Received Book.** Stores Received Book (Specimen No. 25), and mark on it the folio on which it has been entered in that Book.

The entries in the Stores Received Book in turn are posted in the Stores Ledger to the Dr. sides of the **Stores Ledger.** accounts to which they belong. These two books bear to materials the same relation that the Dr. side of the Cash Book and the Cash Account in the Commercial Ledger bear to the cash.

The accounts in the Stores Ledger vary widely in different factories or works. In engineering, building, and many other trades, metals and timbers, under their various sub-divisions, are naturally the chief among a number of other important headings. In some cases, to save the multiplication of Ledger headings, stores are classified as Special or General, the accounts of those falling under the first category being kept individually, and

STORES LEDGER.—SPECIMEN No. 26.

| | | | | | |
|--------------|--------|----------------|-------|------|------|
| Article | | Minimum Stock. | | Cr. | |
| Received | | Maximum Stock. | | Cr. | |
| DR. | Date. | | | | |
| | Folio. | | | | |
| Suppliers. | | | | | |
| Description. | | | | | |
| No. | | | | | |
| Quantity. | | Tons. | Cwts. | Qrs. | Lbs. |
| Price. | | | | | |
| Amount. | | | | | |
| Total. | | | | | |
| Date. | | | | | |
| Folio. | | | | | |
| Description. | | | | | |
| No. | | | | | |
| Quantity. | | Tons. | Cwts. | Qrs. | Lbs. |
| Price. | | | | | |
| Amount. | | | | | |
| Total. | | | | | |
| Date. | | | | | |
| Folio. | | | | | |
| Suppliers. | | | | | |
| Description. | | | | | |
| No. | | | | | |
| Quantity. | | Tons. | Cwts. | Qrs. | Lbs. |
| Price. | | | | | |
| Amount. | | | | | |
| Total. | | | | | |
| Date. | | | | | |
| Folio. | | | | | |
| Suppliers. | | | | | |
| Description. | | | | | |
| No. | | | | | |
| Quantity. | | Tons. | Cwts. | Qrs. | Lbs. |
| Price. | | | | | |
| Amount. | | | | | |
| Total. | | | | | |

those falling under the second being posted to a general Stores Account, or various sectional accounts. Tabular forms are also often used to lessen or avoid great detail in the Stores Ledger. The many uses of this book will be more fully explained as we proceed with our subject, and particularly in the chapter on Surveys. It will suffice at this stage to mention that it is the duty of the clerk keeping the Stores Ledgers to see that the store of certain commodities never falls below the minimum quantity named by the principal, or exceeds the maximum quantity authorised by him.

References to the various records in connection with the purchase of material, and the certificates as to the quality of the goods purchased and of the correctness of the quantity and price can be shown on the invoice itself by means of india-rubber stamps typed as shown below (Specimen No. 27), or by means of a

Certification of invoices.

printed slip which can be gummed or pasted on the invoice.

INVOICE ENDORSEMENT.—SPECIMEN No. 27.

| | |
|-------------------------|------------|
| Invoice Register | No. _____ |
| Stores Requisition Book | Fol. _____ |
| Stores Received Book | Fol. _____ |
| Invoice Allocation Book | Fol. _____ |

2nd part of

Report on conditionStorekeeper
 Approved.....Works Manager
 Price and Amount checked..... Invoice Clerk
 Certified.....Accountant
 Passed for payment on.....by.....
 Cheque or Cash paid on.....by.....

Supplies should be examined or tested as soon as possible after receipt. If there are deficiencies in supplies or defects in them they should be reported on a viewer's advice form without waiting for the completion of the other endorsements, so that the matter may at once be taken up with the suppliers, who might otherwise be justified in refusing to accept responsibility.

Upon being returned to the counting-house the **Invoice Allocation Book.** invoices are entered in an Invoice Allocation or Bought Day-book, from which the items are posted in the aggregate in the Commercial Ledger to the debit of Stores, and in detail to the credit of the vendors of the goods. As these are counting-house books we do not show specimen rulings.

It will be obvious that by these means the debit to the General Stores Account in the Commercial Ledger, on account of material purchased, will agree with the aggregate of the special accounts posted from the Stores Received Book to the Stores Ledger.

Cases arise in which materials or tools are purchased, and for convenience are stored at the seller's works or elsewhere, or are waiting forwarding instructions at a carrier's wharf or railway shed. If the supplier's invoice is dealt with prior to the goods passing through the Stores, the goods represented by the invoice should be debited to a "Stores at Out-Station Account" or "Stores in Transit Account," and not to the General Stores Account. In these accounts stores at the docks or in bonded warehouses may also be included. Sometimes invoices for goods are dated forward so as to lengthen, for the benefit of the buyer, the period during which credit is given, or certain scales of discount are operative. In such cases it is necessary to see that the invoices are brought into the books on the actual and not the paper dates.

Exceptionally, goods may have to be purchased free on cart or rail at seller's works, or at a forwarding station or wharf. In such cases the cost of delivery should be added to the purchasing price of the goods, and the invoice and freight note treated as one document.

The result of the periodical survey of the stores (or stocktaking) would under this system agree not only with the Stores Ledger in regard to the particular classes of materials, but should also agree collectively with the Stores Account in the Commercial Ledger. This is a matter of paramount importance in securing accuracy in factory accounts, and in

**Result of
stock-
taking.**

removing one of the principal elements of uncertainty in a balance-sheet.

So far we have only traced the records it is advisable to make in connection with the purchase and receipt of materials. We have now to consider the routine appertaining to the withdrawal of material from store for the manufacture of stock, for the running or upkeep of machinery and plant, or for any other purpose.

Consumption of materials.

The initiative in the expenditure of material for manufacturing purposes should take the form of an instruction from the principal or manager of the business to the manager of the works to make for stock the required commodities, and authorising the withdrawal from store, by the methods to be described, of such material as may be thought necessary for that purpose. The instruction would probably take a form such as that shown (Specimen No. 28), and might be with two or more counterfoils, or, by means of carbonised sheets, with two or more duplicates according to the number of persons or departments that should be advised in order to meet the needs of particular organisations. In some cases the manufacture may in part be of a number of small and almost similar articles in large quantities, and the material used can only be worked up advantageously in the combination of parts or processes. In such a case, what may be described as generic Stock Orders are often issued by the management, one order covering a variety of similar articles. Standardised and interchangeable parts manufactured for stock as replacements are usually dealt with, as regards registration and routine, in the same way as Stock Orders for a complete article.

Before any order to manufacture is given it is advisable, as tending to produce greater economy in cost of production,

that the designer, draughtsman, or other person best acquainted with its processes and details, on a properly ruled and headed form, should estimate the probable cost that will be incurred in wages and materials and the time that different classes of machinery will be in use in the production of the articles in

Estimate to precede manufacture.

INSTRUCTION TO FOREMAN OF WORKS.—SPECIMEN No. 23.

| | | |
|--|--|---|
| Date _____ | Date _____ | Date _____ |
| Stock Order No. _____ | Stock Order No. _____ | Stock Order No. _____ |
| To _____ | To _____ | To Mr. _____ |
| Particulars of Order. _____ _____ _____ | Particulars of Order. _____ _____ _____ | Please make for Stock to the above number the undermentioned articles, and for that purpose employ labour, and withdraw material from Store as per accompanying estimate, No. _____ _____ _____ |

Foreman _____

Date of completion _____

question. This estimate should be a minimum rather than a maximum one. In all large establishments much advantage is derived from the institution of a planning and progress department which initiates all production instructions, and watches over and superintends the conduct of the productive operations. From this department emanates also from time to time, or at stated periods, a Progress Report, which often sets out as in a percentage form the percentage of work done on an order as at the

date of the previous report, the percentage carried out since, and the percentage remaining to be done. This department is also sometimes responsible for a Weekly Production Return, on which the expenditure under the headings of Labour, Machinery Use, Material, and Expenses is contrasted with the output or production for the week expressed in a percentage or unit form in the case of standardised products, whilst non-standardised products are set out in qualified detail or are grouped. The works

STORES WARRANT.—SPECIMEN No. 29.

| No.—— Requested from Store, 19—— | | | | No.—— Entered in Stores Issued Book, fol.—— Requested and received from Storekeeper, P. C. Ledger folios—— | | | | 19—— | | | | | | |
|--|-----------------------------|----------|-----------|--|-----------------------------|----------|-----------|---------|------|------|--------|---|----|----|
| Article | No. of Order to be charged. | Purpose. | Quantity. | Article | No. of Order to be charged. | Purpose. | Quantity. | Weight. | | | Price. | £ | s. | d. |
| | | | | | | | | cwt. | qrs. | lbs. | | | | |
| | | | | | | | | | | | | | | |

manager or foreman should be supplied with a complete specification of all material and parts included in the estimate. The storekeeper should also be furnished with the same particulars, and should not, without special authority, issue more material for the order than is estimated. There is always a tendency for more time and material to be spent in manufacture than are absolutely necessary, and the probability is that when once a surplus quantity of material has been withdrawn from store, instead of being returned undiminished, it is in great part, if not

entirely, lost in wasteful processes or in other ways ; or the effective localisation of cost may be hindered by foremen exchanging material with each other without the exchange being properly recorded.

The foreman, having received instructions to proceed with the manufacture, should draw upon the storekeeper for material to the estimated extent by means of a requisition, sometimes called a Stores Issue Note, but which, to prevent confusion with the Stores Issued Book, and for technical distinction, may be called a Stores Warrant. This may either have a counterfoil as shown (Specimen No. 29), or be written in duplicate by means of carbon sheets ; or on a single sheet printed in copyable ink, so that the form itself, as well as the entries written on it, may be copied by means of a press.

In some factories, save in cases of emergency, the Store is open for distribution for certain periods at certain hours only. In other factories stores are issued on warrants

STORES ISSUED BOOK.—SPECIMEN NO. 30.

| Date. | No. of Warrant. | Supplied to | Articles. | Working No. or Purpose to be charged. | Dimensions. | Quantity. | Weight. | | | Price. | Amount. | | | Ledger Fol. | Remarks. |
|-------|-----------------|-------------|-----------|---------------------------------------|-------------|-----------|---------|------|------|--------|---------|--|--|-------------|----------|
| | | | | | | | cwt. | qrs. | lbs. | | | | | | |
| | | | | | | | | | | | | | | | |

signed by the workmen, the foreman countersigning them at the Store in the course of the day on which the material is issued. In some industries, and in the case of some individual factories, material is priced out, not at the price actually paid, but on the basis of an average cost over

different periods monthly, quarterly, or half-yearly as the case may be; the balance of quantities at various costs being brought forward from time to time.

The storekeeper should enter all materials issued by him in compliance with warrants in the Stores Issued Book **Stores Issued Book.** (Specimen No. 30), which in due course is posted in the Stores Ledger to the credit of the respective accounts.

When the business is a large one, or where the repeat warrants for small quantities or small parts are numerous, a "sub-store" is often established in one or more of the shops, in which sub-store fixed quantities of supplies are to be held at each weekly or other period, the quantities used during such period being drawn by means of local or internal requisitions, which are transferred to one of the general requisitions at the end of the period, when the necessary parts or quantities would be issued from the main store to make up the fixed supply.

Some little difficulty may be experienced both by the storekeeper and the clerk keeping the Cost Books referred to in a following chapter, unless some arrangement is made by which all warrants are numbered consecutively. When they all emanate from one centre they may be consecutively typed in the books when printed, but when they emanate from foremen of several departments or leading hands in various shops, it will be found advantageous for the storekeeper to be provided with a numbering machine, with which to type number all warrants as they reach him. The warrants from the different shops or departments may be printed on differently tinted papers, and may bear the departmental consecutive number, the storekeeper's number being impressed over, alongside, or under it.

**Numbering
Stores
Warrants.**

All labour and material expended in manufacture of goods should be booked to the Number appearing on the **Stock Order Nos.** order given by the principal, for convenience called the Stock Number, to distinguish it from the Working Number hereafter referred to. Working Numbers are those assigned for recording the recurring and general costs of the factory, the maintenance and upkeep of plant, machinery, and buildings, and any expenditure other than that incurred in manufacture for stock.

The Stores Warrant when entered in the Stores Issued Book should be forwarded to the counting-house, where **Cost Book.** it finds its way into the Cost Book, and forms one of the constituents of the credit to the stores account in the Commercial Ledger. The Stores Warrants may be posted direct into the Cost Ledger, as will be shown in the next chapter, or it may in some cases be found desirable to post them in a Stores Journal under the respective Stock, Plant, or other orders, to be hereafter described, with the necessary information as to material, weight, number, rate, and cost fully entered therein, and to post the totals of these entries to the respective orders in the Cost Ledger every quarter or half year as may be considered the more serviceable. In such cases reference for details can, when desired, be made back from the Cost Ledger to the Stores Journal, and eventually to the Stores Warrant.

In some cases where there are numerous issues of the same class of material for the same Stock or Working numbers, to reduce the amount of clerical work, the individual warrants are summarised at the end of each week or month, and the monetary calculation worked out for the period and not for the individual issues.

Before leaving the subject of the stores books, however, it is necessary to explain that materials returned to vendors are entered in a Stores Rejected Book (Specimen No. 31), which, in its purpose, is coextensive with the Stores Issued Book.

The entries in this book are based upon the credit notes received from the vendors for the goods returned. The storekeeper should on returning any goods to the vendors enter the transaction in the Stores Rejected Book, but leaving the spaces for the number and date of credit note, and the rate and value of the returns blank, until he

STORES REJECTED BOOK.—SPECIMEN No. 31.

| Date. | No. of Credit Note. | Returned to | Articles. | Dimen- sions. | No. | Weight. | | | Price. | Amount. | Account to be Credited. | Stores Ledger Folio. |
|-------|---------------------|-------------|-----------|---------------|-----|---------|------|------|--------|---------|-------------------------|----------------------|
| | | | | | | Cwts. | Qrs. | Lbs. | | | | |
| | | | | | | | | | | | | |

has received through the counting-house the credit note from the vendors. The office is advised of the rejection of goods either by an entry on the invoice or by means of a Stores Sent Away form.

This Stores Sent Away form may require registration in the counting-house in the same way as an invoice, and the book records will be similar. If it be thought inadvisable to open a credit note register, the notes may be registered in red ink in the Invoice Register Book and the words "credit note" might be added. The credit note may, by means of an india-rubber stamp, bear references corresponding to those impressed

Registration of credit notes.

on the invoices. Specimen ruling No. 27 will equally apply in this case, save in the titles of the books referred to, which would be:—

Credit Note Register No. _____
 Stores Rejected Book Fol. _____
 Goods Returned Outward Book Fol. _____

It will probably be found that in many cases a reference to the Stores Requisition Book can be dispensed with on

STORES DEBIT NOTE.—SPECIMEN NO. 32.

| No. _____ | | | No. _____ | | | | | | | | | | | | | | | |
|------------------------|---------------|----------|---|----------|---------------|--|-----|---------|------|------|--------|---------|----|----|--|--|--|--|
| Sent into Store, _____ | | | Dept. _____ | | | Entered in Shop Returns Book, fol. _____ | | | | | | | | | | | | |
| 19 . | | | Sent to and received by Storekeeper _____ | | | 19 . | | | | | | | | | | | | |
| Article. | No. of Order. | Purpose. | No. | Article. | No. of Order. | Purpose. | No. | Weight. | | | Price. | Amount. | | | | | | |
| | | | | | | | | Cwts. | Qrs. | Lbs. | | £ | s. | d. | | | | |
| | | | | | | | | | | | | | | | | | | |

the credit note. If the rejections are at all numerous, owing to the nature of the business, or to the nature of the stores used in manufacture, it may perhaps be desirable not only for the storekeeper to keep a Stores Rejected Book, but to advise the office of defects in material by means of a Stores Rejected Note, and to send with it the original invoice duly cancelled. This note should specify the reason for rejection, either as regards non-compliance with terms of the order or quality of material. It is desirable that examination of stores should be made as promptly as

possible after receipt, but that right of rejection should be reserved with regard to those Stores defects in which can only be observed when they are worked up or worked upon.

In addition to the process of receiving, examining, and, if need be, rejecting stores supplied by vendors, and of issuing material for manufacture, the storekeeper will receive from the foremen or over-lookers material which has been drawn out in excess of the quantity required, or the scrap material from some manufacturing operation. It is not unusual for material drawn out of store in excess of requirements to

Return to store of surplus material.

SHOP RETURNS BOOK.—SPECIMEN No. 33.

| Date. | No. of Stores Debit Note. | Returned by | Articles. | Order No. or job for which Articles were with-drawn. | Dimen-sions. | No. | Weight. | | | Price. | Amount. | | | Stores Ledger Folio. |
|-------|---------------------------|-------------|-----------|--|--------------|-----|---------|------|------|--------|---------|----|----|----------------------|
| | | | | | | | Cwts. | Qrs. | Lbs. | | £ | s. | d. | |
| | | | | | | | | | | | | | | |

remain in the factory, and be used for the next similar stock order, but this procedure is open to serious objection, and the desirability of sending the material back to the

Stores Debit Note.

store with a Stores Debit Note (Specimen No. 32) cannot be too strongly urged. Not only does the direct return of material to store prevent waste or improper appropriation, but it conduces to the localisation of the cost of manufacture. If the surplus material is not so treated, the stock order, in respect of which it has been withdrawn, will appear at a higher cost than it should, while the work upon which such material is used without warrant will have the benefit without being charged. In

either case the records of cost of production are fallacious, and loss may thus be incurred. In some cases in which rigid adherence to this rule involves great inconvenience and expense, it is sometimes allowed to transfer material from one shop to another by means of a Shop Transfer Note, and at regular intervals to issue corresponding Stores Debit Notes and Stores Warrants. It has been suggested that these adjustments might be made and the number of entries reduced and clerical labour saved by the issue of temporary notes, and the issue of Stores Warrants postponed until the facts were definitely ascertained, when Stores Warrants could be made out for the quantity actually used, which with the stores returned would equal or cancel the temporary note. In some cases this procedure might be practicable, but it is open to the objection that it would largely nullify the advantages of the Stores Ledger as indicating the actual quantity of the different kinds of goods in stock, and it would probably tend to delay in the compilation of the Cost accounts, as the debits to the Manufacturing Order could not be entered whilst any temporary notes were outstanding. This procedure would prevent stocks present being an accurate guide to the necessity or otherwise of ordering further supplies.

The old material, or "Shop Sweepings," which cannot be credited to any particular Stock Order, should be returned to the stores with a Stores Debit Note crediting it to one or more of the series of numbers or standing orders allotted to maintenance of machinery. It is desirable to pass all saleable material through the stores in this manner whether it is sold forthwith, or remains till a quantity has accumulated, or prices have risen. In the case of the sale of all such material, it is usual to stipulate for payment when price is accepted, or before delivery. Material spoiled

in working, or defective products or "wasters," should also be returned to, or passed through, the stores by means of a Stores Debit Note, the working or other order number should be credited with the full cost of the material and the work done on it, and the difference between such cost and the value of the product should be debited to a Complaint, Mistakes, Spoilt Work, or Waste account, which should be so analysed that each shop or department, and each employee who has contributed to the result, may be reminded in due course of the cost of carelessness. In some trades, such as foundry and pottery, a certain percentage of defective products are a normal factor in production. In these instances the same procedure may be adopted, and will tend to prevent any increase in the percentage, and in some cases to reduce it, owing to detailed information leading to inquiries as to the cause or causes of the increase.*

* There is great variation in the mode of dealing with waste as an item of cost in Cotton and similar mills. Some of these methods and the incidence of waste in cost are described in "Textile Manufacturing Costs," by Joel Harlen, *The Journal of Accountancy*, New York, and in a paper on Cotton Mill Accounts, read at the annual meeting in 1913 of the National Association of Cotton Manufacturers (Boston, Mass.) by Joel Hunter, C.P.A.

An interesting lecture on Spoilage as "the Fourth Factor in Cost Accounting," by Gordon Wilson, appeared in 1917 in *The Journal of Accountancy*, New York.

"The value in use of a bell with a flaw in it is very little; it can be used only as old metal, and therefore its price is only that of the old metal in it. When it was being cast the same trouble and expense was incurred for it as for other bells which turned out sound. Its expenses of production were the same as those of sound bells; but they have good value in use, and are therefore sold at a high price. The price of each particular bell is limited by its value in use. What the law of Normal Value states is that the price of cracked bells and sound bells together must, in the long run, cover the expense of making bells." Professor Alfred Marshall, "Economics of Industry."

The Stores Debit Note having been posted by the storekeeper in a Shop Returns Book (Specimen No. 33), is forwarded to the counting-house, where it is dealt with as recording a factor in the cost, as will be explained in the following chapter.

The entries in the Shop Returns Book are (as shown in the Diagram II.) posted to the Dr. side of the Stores Ledger.

There is another source from which a storekeeper may receive goods, viz., from the warehouse of the firm. These cases are likely to be exceptional, and can be more fully and conveniently dealt with in the subsequent chapter on Stock. At present it suffices to say that as between the warehouseman in charge of the manufactured commodities or stock, and the storekeeper in charge of the raw material of trade or stores, the departmental adjustments of accounts are made by means of a Transfer Book. The nature of this book will be explained later, and it is necessary to anticipate the subject at this stage to the extent only of stating that, so far as the storekeeper is concerned, the items in the Transfer Book are posted in the Stores Ledger to the Dr. side of the respective accounts in the same way as other receipts of material.

Sometimes the storekeeper may have sent into store material which has been recovered from plant and buildings, or parts of machinery which is no longer serviceable. In these cases the stores accounts will be debited in the usual manner, by means of a Plant Recovered Note. These transactions in relation to the machinery and capital account of the business will be dealt with in the chapters on Fixed Capital and Machinery Use (Chapters VI. and VII.).

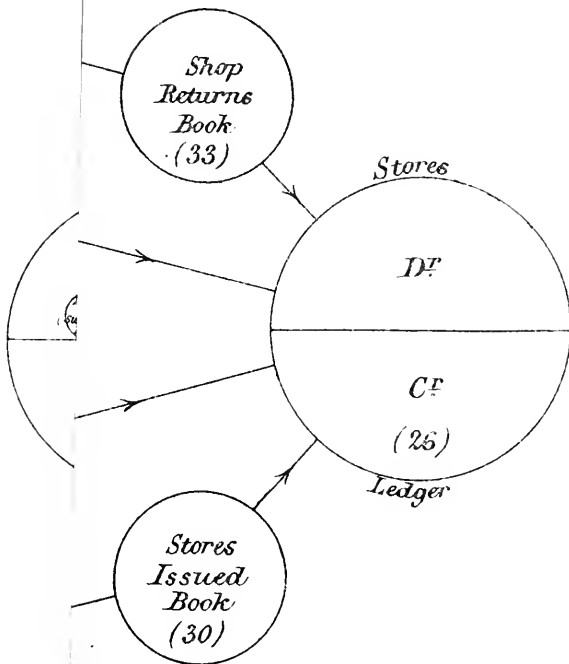
Diagram II. gives a complete view of the books and

forms mentioned in this chapter, and their connection with each other, and we would refer to the remarks in the Introductory Chapter to the effect that the books are suggested more for the purpose of showing what the transactions are than as giving stereotyped forms applicable to every case without modification. It will be manifest that, provided the principles are not lost sight of, there is every scope for further division, or greater concentration, as may be required.

The procedure referred to in this chapter, as well as other chapters in this book, is in principle, and with but slight modification in practice, applicable to ascertaining and recording the cost of continuous processes, per ton, per thousand feet, or other unit of weight or measurement. In some trades two or more qualities of the same article, or residual, or bye-products may be produced at the same time. In such cases all items of cost that are directly incurred in connection with a particular product should be so allocated, whilst items, like motive power, of which the direct incidence is not known, when their use cannot be localised, can be distributed over the various products on a percentage basis, the scale on which such percentage is based generally having the time taken by the various products as the main factor.

It is desirable that, as far as can be done, bye-products should be treated as distinct branches of the business, so that the cost of, and the return from, the prime or original product shall be ascertained with the maximum accuracy obtainable. The methods adopted in the early stages of the Gas Industry, of deducting the revenue derived from residuals from the cost of the coal used for the manufacture of gas, and thus arriving at a net cost of coal for costing purposes, has been adopted by many industries which have residual products, and is still largely used. This method

WITH STORES.

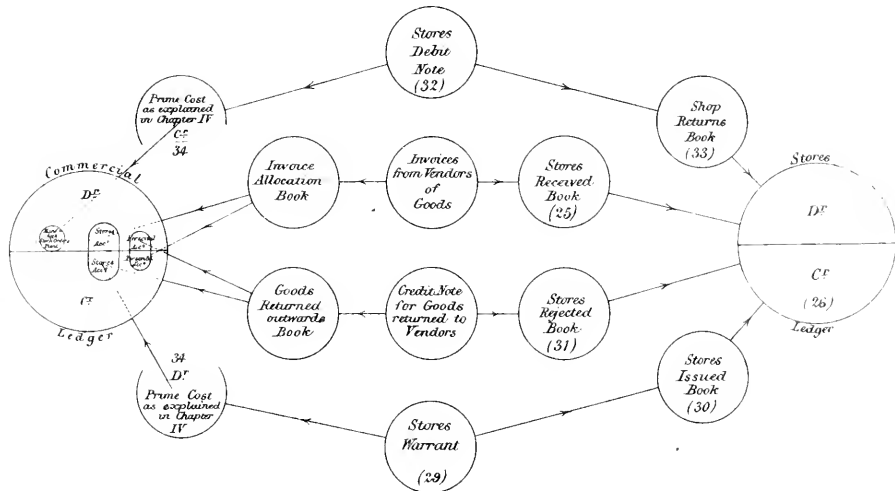


use, and Plant, being contingent diagram.

DIAGRAM II.

SHOWING THE RELATION OF THE BOOKS AND FORMS USED IN CONNECTION WITH STORES.

(The numbers, where shown, correspond to the specimen rulings.)



The Transfers between Warehouse, Plant, and Store, and between Store, Warehouse, and Plant, being contingent and purely departmental adjustments, are not shown on this diagram.

assumes that all bye-products are sold at cost, and throws all cost for a time upon the main product. In cases in which it may not, under present circumstances, be possible to discern the cost of joint products, the market or sale value of the bye-products, less a certain percentage, might be taken as the cost, as this would afford some information as to the cost at which the manufacturer, the least advantageously situated, could afford to sell the product.

CHAPTER IV.

PRIME COST AND THE COST LEDGER.

IN the two preceding chapters we have dealt with the routine appertaining to the payment of wages and to the receipt and issue of material. We now propose to indicate the manner in which these two so far independent factors may be united, with the view of obtaining a record of prime cost, and by the inclusion of other items of expenditure, as described in succeeding chapters, of ascertaining the cost of production.

As we shall deal with the distribution of commodities in a following chapter, we do not here refer to the question of stock, except in so far as it has a bearing upon the question of stores and cost of production generally. It is well, however, at the outset to explain that, so far as the manufacture of commodities is concerned, we regard it as axiomatic that all articles, whether produced in pursuance of an order received from outside or in anticipation of future demand, should be booked as if they were intended to constitute part of the standing stock in trade.

This method of describing as stock all articles manufactured necessarily involves a clear distinction being drawn between material used in manufacture, and the manufactured article which is the product of the expenditure of labour, machinery and material, or in other words between stores and stock. The utility may not at once be apparent of passing through

**Distinction
between
stock and
stores.**

the Stock Books, as distinguished from the Stores Books, commodities manufactured to supply a definite order, and which are not likely to form part either of the normal, or of the exceptional stock in hand of the business, but it will be evident that there is a distinct advantage in treating all orders to manufacture in the same way, whether they be of a special or of a standard nature. Confusion necessarily arises if part of an order for articles made in the factory is treated as if supplied from stock, and another part as if supplied from stores. We recommend therefore that all material and parts required for purposes of manufacture should be withdrawn from store and charged to their proper stock orders. If the article has in reality been manufactured in execution of a customer's order, it should be withdrawn from the warehouse, and credited to the stock accounts, by the process described. The importance of uniformity in the treatment of the orders to manufacture is particularly exemplified when the cost of any article which has not previously been made, or made only to a very limited extent, is to be taken as the basis of calculations for more extensive transactions. A simple illustration will make our meaning clear. If a customer orders a suite of furniture to be made, we maintain that, instead of the expense of executing that order being debited to one account, the several pieces making up the suite should be made to separate stock orders. In this way, while the cost of each individual piece would be known, the cost of the suite would be ascertainable by aggregating the costs of all the pieces, whereas, if the whole of the labour and material required for the production of the complete suite had been indiscriminately charged to one account, it would be difficult to determine the cost of any one piece, should it be required to be replaced or to be manufactured more

extensively. It is well to exclude all probable sources of error, and this is largely promoted by clearly recognising the distinction we have drawn between materials and manufactured goods. In cases in which processes are continuous in time, the product of one process can be charged out at its cost to the next process; but in those cases in which the product from one process has to be kept or stored before it is used as the raw material of another process, it is desirable that an inventory of such product should be kept, preferably in the department in which it is produced. The general principles of Process Costing are applicable, and are applied, not only in chemical and similar industries, but in extensive ramifications in the case of metalliferous mines from the getting of the ore to the shipment of matter or metals.

It having been decided to manufacture certain commodities, the instruction referred to in the preceding chapter (Specimen No. 28) will be issued. One part of the form will convey to the manager or foreman instructions to manufacture; the other is for the use of the clerk keeping the Cost Ledger, and will be taken by him as an advice of what orders are in hand and as a guide to the folios to be reserved for such orders in his Ledger. The counterfoil, to which the forms may be attached upon the completion of the order, will be retained by the principal.

It is important not only to know the cost of each individual article produced, but equally so to ascertain the cost of any particular part, or of any particular process of manufacture. Localisation of cost should be carried as far as possible, so that the varying rates of realisable profit on parts may be known, and the pressure to minimise cost of production be applied in the right direction. The tendency to the specialisation of

**Initiatory
stage of
manufac-
ture.**

**Cost of each
separate
process.**

labour has grown, and is growing, with the extension of the factory system and the use of machinery, and the economy thereby induced can only be rendered thoroughly effective by a complete analysis of cost. As a well-known writer on this subject has said, "One of the first advantages which suggests itself as likely to arise from a correct analysis of the expense of the several processes of any manufacture is the indication which it would furnish of the course in which improvement should be directed. If any method could be contrived of diminishing by one-fourth the time required for fixing on the heads of pins, the expense of making them would be reduced about thirteen per cent. ; whilst a reduction of one-half the time employed in spinning the coil of wire out of which the heads are cut, would scarcely make any sensible difference in the cost of manufacturing the whole article. It is therefore obvious that the attention would be much more advantageously directed to shortening the former than the latter process."*

The fact that since this passage was written the process of manufacturing pins has been shortened and cheapened in the way referred to, serves to bring into clear relief the truth of the principles enunciated by the writer.

A similar change has taken place in the production and in the cost of matches. In an article in *Engineering* it was pointed out that the introduction of machine methods had decreased the cost of manufacture to one-eighth the cost in 1844. In the machine process there are ten operations against four by hand, machines being used to cut the wood into splints, to place them in the dipping frame, to dip them in the sulphur and composition, and to remove them from the frame, and even to put them into boxes. All

* "On the Economy of Machinery and Manufactures," by Charles Babbage. 4th edition. London : John Murray.

these operations are done for 1,440,000 matches in less than eight hours, and then the packing done by six females takes twenty-one hours forty-two minutes. Obviously, says *Engineering*, a packing machine was needed, for of the labour cost for making the matches—about 1s. per 100,000—9d. went for packing and only 3d. for the actual work of manufacture. The cost of making the matches by hand was, in 1844, about 7s. 6d. per 100,000, or nearly eight times more.

In costing the various processes in cotton mills, finer combs or qualities at certain stages of production require a longer time to produce the same weight than do the coarser combs or qualities, and the expenditure after these stages has to be allocated on a different basis from those applicable to the preparatory stages, in which the same considerations do not arise.

A description, from a politico-economical point of view, of the advantages arising out of the division of labour does not fall within the scope of this treatise. These advantages have been ably expounded by Mr. Babbage, by Professor Alfred Marshall and Mary Paley Marshall, and other writers.

The principles applied in these pages to recording the cost of production of any article are equally applicable to recording the cost of any or all of the parts of that article. Either subsidiary stock orders numbered consecutively may be passed, or the stock orders for parts may be denoted by the number of the original stock order and a letter of the alphabet. Upon the completion of all the component parts, the accounts in the Cost Ledger of the various stock orders could be grouped, so as to constitute in the aggregate the cost of the complete article.

For the purpose of booking the expenditure upon small parts with the minimum amount of labour, a nomenclature enabling every detail to be accurately and concisely

defined by a symbol is exceedingly desirable. It would, on account of the labour involved, be an obstacle to the attainment of the object in view if the size, purpose, and relative position of every separate piece had to be expressed in ordinary language.

Nomenclature of parts.

We reproduce, therefore, a paper by Mr. Oberlin Smith,* in which is suggested a symbolic nomenclature of the kind required, if the system of taking out cost is to be applied to small parts, as is especially desirable where such parts are standardised and interchangeable. This mnemonic system has been amplified by Mr. Henry R. Towne, of the Yale & Towne Co. of Stamford, Conn.

As all labour and material are not directly spent in the manufacture of articles, but are partly devoted to the maintenance, repair, or renewal of buildings, machinery, and plant, and to other objects, it becomes necessary to record

the expenditure upon the subsidiary purposes, and to provide for its distribution over the various manufacturing operations or orders.

Expenditure other than for manufacturing purposes.

Whilst the cost of setting tools and machinery to perform certain operations may be charged directly to the stock order on which the expenditure is incurred, labour or material spent in the erection of additional, or the maintenance, repair, and renewal of existing machinery, cannot be apportioned with the same precision to any particular stock order, as the cost of the use of machinery is the product of many variable factors. The considerations which should determine the amount to be debited to any stock order on this account will be most conveniently referred to, and considered in connection with the question of the charges to be made for the use of machinery, in Chapter VII. In some cases the machine setter's time is charged to the Machine Account, as described in that

* See Appendix A.

chapter. In other cases it is charged as a percentage on the machine operator's wages. In some other cases the machine hour rate is made to include the labour of the machine operators, whereby little, if any, direct labour charge appears in the account dealing with the particular order.

Another direction of expenditure lies in the maintenance, repair, and renewal, extension, or erection of workshops, warehouses, stores, and other buildings. All such expenditure may be recorded under general or various sub-headings in the Cost Ledger, or preferably in separate Plant and Buildings Ledgers. These ledgers, in addition to the ordinary rulings, should, for *aide memoire* purposes, contain records of the number of the building or the plant, location, description, and original cost and name of maker.

**Localisation
of mainten-
ance ex-
penses.**

The utility of these separate ledgers will be more apparent after a perusal of the chapter already referred to. So as to ensure the maximum amount of localisation of cost, the recurring items in the maintenance of machinery and buildings, and the renewal and replacement of tools may receive a distinctive series of numbers or standing orders, and thus the cost for each floor, or wing of a building, may be ascertained. For expenditure on such recurring items, the manager of the works may receive standing instructions; but expenditure on special items of maintenance or on additions to fixed capital and loose plant and tools should be estimated for, and authorised in the same way as the execution of Stock Orders. When in order to proceed with a certain stock order it is necessary to make special tools to enable the work to be done, it will be convenient to charge all time and material spent on their production to a tool order bearing the same number as the stock order number to which the goods are to be made. The cost of these will be recorded in the same way as the cost

of other tools, but the number to which they are made serves to identify them, and as they have been made specially, and may or may not be again required, their cost must be considered in the determination of the selling price of the articles, the manufacture of which necessitated their production.

The same general principles are also applicable for recording the cost of machinery or apparatus sent to the works for repairs or alterations. If such cases are not numerous it may suffice to introduce some letter or numeral in the Stock Order Number, to show that the order is not a manufacturing, but a repairing or jobbing one. In other cases it may be desirable to start a series of what are often called "Jobbing Orders," and to record the costs in a special Jobbing Ledger, which would be supplementary to the Cost Ledger. This latter course is certainly convenient where a "Jobbing Shop" is constituted in a special part of the works. In some cases the principle is adopted of charging a percentage on the actual cost of Jobbing Work as a charge for the use of plant and machinery. As has been pointed out by Mr. A. Cathless, O.B.E., C.A., although there is only one system of costing there are three different methods of grouping the resultant financial statistics, viz., Job Costing Process (or Continuous Production), Costing, and Operation Costing. In this case the word "Job" is used in a different sense from that in which it is used in the preceding paragraph. Mr. Cathless applies the term Job Costing to cases in which the order is for a single article, or a number of articles to be produced within a short period. Process Costing he applies to the production of articles that are constantly being made, whilst Operation Costing is applied to a further analysis of process costing.

Other channels of expenditure, such as the cost of the drawing office, and the wages of foremen, gatemen, time-keepers, and others who are engaged in supervision, or in

the distribution of stores, in keeping time records, or in any similar work, may be recorded either under a special heading for General Charges in the Cost Ledger, or in a Factory General Charges Book. In some cases the whole of the expenses of the Stores Department are charged off by a loading or percentage commission being charged on the price of the stores. It has also been suggested that the discount obtained on the purchase of goods should be placed against the expenses of the Stores Department, but in this connection it should be remembered that the benefit of trade or scale discounts would thus not be accurately recorded in the accounts. As will be explained in a subsequent paragraph, the factory general expenses may be summarised at any period for the purpose of distributing their incidence and a ratio established between them and the total amount of the wages expended on the various orders during the same period.

We are now able to consider the functions of the Cost Ledger in which the prime cost of any manufactured article is aggregated and recorded, with a view of obtaining the cost of production. This book is often in the form of the loose leaf or perpetual ledger, which by the facility it gives for separation of, and reference to, accounts without sacrifice of security, has more manifest advantages in the case of the Cost Ledger than in the case of the ordinary ledger. In it are summarised the allocation of wages spent on manufacture, alluded to in Chapter II., and the various warrants for stores used in manufacture, alluded to in Chapter III. In addition to these two channels of expenditure it will be observed that the Cost Ledger (Specimen No. 34) provides a column for machinery charges, arrived at on the principles set out in

that in the case of materials his totals agree with the credits to the stores account in the Commercial Ledger for stores issued, cognisance being taken of the credits in the Cost Book; the corresponding debits to stores represent the materials drawn out to a given number but not consumed on that job, and therefore returned to store, as explained later. In the case of Machinery Use, he will

STOCK DEBIT NOTE.—SPECIMEN No. 35.

| No. _____ | | | | No. _____ | | | | | | | | | | |
|-----------------------------|---------------|----------------|-------|---|----------|---------------|-----|---------|-------|------|-------|---------|---|----|
| Sent into warehouse ____ 19 | | | | Sent to and received by warehouseman _____ 19 | | | | | | | | | | |
| | | | | Stock Received Book folio _____ | | | | | | | | | | |
| Article. | No. of Order. | No. or Weight. | | | Article. | No. of Order. | No. | Weight. | | | Rate. | Amount. | | |
| | | No. | Cwts. | Qrs. | | | | Lbs. | Cwts. | Qrs. | | Lbs. | £ | s. |
| | | | | | | | | | | | | | | |

Sent into warehouse by _____ Received into warehouse by _____

see that his total agrees with the total credit for the same period to Machinery Account, as explained in Chapter VII. As regards petty cash, the totals should agree with the debit through the commercial books to sundry disbursements on manufacturing account.

Before explaining the credit side of the Cost Ledger it will be well to give a specimen of the form called a Stock Debit Note (Specimen No. 35), which is made out concurrently with the sending of commodities into stock.

This form, which may have a counterfoil, or be copied by means of carbon sheets, emanates from the leading hand in the shop. The monetary column is filled in by the prime cost clerk from such data as he has in his Ledger, and the contents of the note are entered by him on the credit side

STOCK RECEIVED BOOK.—SPECIMEN NO. 36.

| Date. | No. of Stock Debit Note. | No. of Order. | Article. | Dimen- sions. | No. | Weight. | | | Rate. | £ s. d. | | | Stock Ledger folio. |
|-------|--------------------------|---------------|----------|---------------|-----|---------|------|------|-------|---------|--|--|---------------------|
| | | | | | | Cwts. | Qrs. | Lbs. | | | | | |
| | | | | | | | | | | | | | |

of that book. The warehouseman or other person in charge of the manufactured goods will, in his turn, make the necessary entry in the Stock Received Book (Specimen No. 36), which bears the same relation to stock that the Stores Received Book, explained in Chapter III., bears to stores.

Stock Received Book. The entries in the Stock Received Book are posted in the Stock Ledger (Specimen No. 37).

Besides the Stock Debit Note there are posted to the credit side of the Cost Ledger the credit notes (referred to in Chapter III.) for surplus or scrap raw material returned to the store.

By abstracting the credit side of the Cost Ledger periodically, it will be seen that it agrees with the amounts passed through the commercial books to the debit of stock account (and credit of stock orders account) for stock sent into warehouse, and with the debit to the stores account (also credited to stock

where it is found inexpedient to proceed concurrently with the manufacture of all the articles comprised under the Stock Order No. to which labour and material are being booked. That is to say, while all materials required for the manufacture of a given number of articles may have been withdrawn from store, it may be found necessary to complete and consign to the warehouse a smaller number of the articles first, instead of proceeding, *pari passu*, with the manufacture of all. But this difficulty is more apparent than real, inasmuch as any debit or credit balances which, upon completion of an order, may be found to exist, can be adjusted by the commodities last produced to that order being taken into stock at prices slightly reduced or increased to the extent of the difference; or the balance may, if preferred—and must necessarily if all the articles comprised in the Stock Order are disposed of—be at once carried to the debit or credit of trading account, or the sales account of any particular branch.

The total of the balances remaining on the various Stock Orders will of course represent at any given time the expenditure on work in progress at that date, whether in execution, or in anticipation, of a customer's orders. Further confirmation of the accuracy for balance sheet purposes of this compilation, may be obtained by the works manager being required to certify that he has in process work of the value shown on each order.

CHAPTER V.

INDIRECT OR INCIDENTAL EXPENSES AND THEIR ALLOCATION.

HAVING shown that all the direct channels of expenditure can be summarised in the Cost Ledger, it remains for us to show how the incidence of the shop expenses capable of direct apportionment, and the cost of factory superintendence, may, by means of a Cost Journal, be fairly distributed over the various manufacturing operations.

Allocation of factory general charges. In 1887, when the first edition of this book appeared, the direct expenditure in wages and materials only was in many establishments considered to constitute the cost; and no attempt was made to allocate to the various working or stock orders any portion of the indirect expenses often referred to as Expenses, Fixed Charges, Oncost, Expense Burden, or Dead Expenses. Under this system the difference between the sum of the wages and materials expended on the articles and their selling price constituted the gross profit, which was carried in the aggregate to the credit of profit and loss, the indirect factory expenses already referred to, together with the establishment expenses, and an allowance for machinery and buildings under the general term depreciation, being particularised on the debit side of that account. This method had certainly

simplicity in its favour, but an efficient check upon the indirect expenses and accurate data for costing purposes can only be obtained by establishing a relation between the indirect and the direct expenses. This is done (1) by distributing all the indirect expenses such as wages of foremen, rent of factory (where the land and buildings are owned by the occupiers, a charge for rent should nevertheless be brought into the accounts), fuel, lighting, heating, and cleaning, etc. (but not the salaries of clerks, office rent, stationery, and other establishment charges to be referred to later), over the various departments or shops specifically, and in turn distributing the departmental or shop totals over the various working and other orders as a percentage, either upon the wages expended upon the jobs respectively, or upon the cost of both wages and materials. If, for example, the aggregate wages expended in manufacture during the year amount to £10,000, and the materials consumed to £6,000, while the indirect factory expenses amount to £800, then if the latter are to be distributed in proportion to the wages paid, the cost of each job would be increased by 8 per cent. of the labour expended upon it; or if the indirect expenses are to be distributed in proportion to the first cost in wages and materials, each job would be increased by 5 per cent. of the amount of its first cost. In some cases (2) this shop "oncost" is distributed by two percentages, the one being based on the wages paid, the other on the value of the material used. In many undertakings in which machinery is not largely employed, more accurate results would be obtained by charging the indirect expenses as a percentage upon the amount of the *direct wages*, and not upon the material, for the prices of some raw materials fluctuate so very widely that the other method described would render

the cost comparisons of one year with another to some extent misleading.

In foundries these indirect expenses are as a matter of practice generally distributed in proportion to the weight of the castings, and not on the wages. In this class of work there is not great variety in the material used, or large variation in the prices thereof, and the foregoing objection is thereby somewhat mitigated.

In referring to the allocation of factory expenses in proportion to the labour expended upon the articles manufactured, we have taken the *amount* of wages paid as one of the factors in the equation, but the wages paid for skilled and for unskilled labour respectively may vary so largely as to make such an equation fallacious in particular cases, though quite correct in the aggregate; whilst the amount of burden is in general more nearly proportional to the number of men employed than to the amount of the pay bill; and that (3) a relation based upon the *time** during which the labour is employed, instead of upon the *amount* of the wages paid, would be more accurate. For instance, unskilled labour of a given amount is employed during a much longer period than skilled labour of the same cost, and it does not appear quite reasonable that it should bear only the same proportionate charge for superintendence, lighting, fuel, and similar expenses, the amount

* "The true measure of economy must include a comparison of the value of the product with the cost of its production. But it must also include a comparison of the time taken to produce the result. . . . The economy of an industry must therefore be measured as a time rate. It is directly proportional to the value of the product, and inversely proportional to its cost, and to the time taken to make it, and to realise its value" (Professor R. H. Smith on "The Measure of Industrial Economy," *Economic Journal*, March 1906). In this article Professor Smith deals with three ways of bettering production—by increasing rate of production per time unit, by decreasing cost of production per time unit, by decreasing time spent in making and realising value of product.

of which is greater or less according to the time the workmen are employed. In some cases this is met by ascertaining at the completion of each job the number of hours at individual rates of pay spent thereon, and charging for such number of hours an hourly "oncost" rate, estimated on a basis which will at balancing periods cover the cost of these charges. In dealing, in the first five editions of this book, with the question of the depreciation of plant, we described in some detail a method (4) of distributing the incidence of a charge for the use of plant over a variety of objects upon the time basis or machine rate, and stated that the method was equally applicable to the allocation of indirect expenses or Factory General Charges. We have pointed out that a system of costing based on wages alone is fallacious, as a man working at an hour rate may be working alone or with a machine for which an hour rate higher than his own is payable. Subsequent writers have followed up the suggestion, and worked it out in considerable detail as a proper means of distributing the expenses burden over production orders.

The charge for this use is on the basis of a machine hour rate. Each machine is debited with its direct cost of running and maintenance, as well as with its proportion of factory general charges, such as lighting, heating, and power. The charges so made to the Plant or Machinery Ledger (Chapter VII.) would correspondingly reduce the amount of factory general charges to be otherwise dealt with, and would permit of a more detailed analysis of cost. An accurate allocation of the cost of using machinery is as important as an accurate allocation of the cost of labour and material, and may often be the determining factor in deciding if hand labour or machine power is the cheaper instrument of production for some particular part or pro-

cess. The utility of such records does not cease with the substitution of machine power for hand labour, as they show the comparative costs of the use of machines of different types or powers for the same or similar processes.

Before passing from the question of the allocation of shop "oncost," it may be mentioned that in some, but a diminishing number of cases, employers consider that sufficiently accurate results are obtained by taking the average rate paid for direct labour in each shop or department, and by adding thereto such a percentage rate as would, over a series of transactions, equate the amount charged to the "oncost" account.

The item of Depreciation may, for the purpose of taking out the cost, simply be included in the category of the indirect expenses of the factory, and be distributed over the various enterprises in the same way as those expenses may be allocated; or it may be dealt with separately and more correctly in the manner already alluded to and fully described in the following chapter.

A large proportion of the expenses of the drawing office can be charged to the various working orders, the statement of the work done in the drawing office and the time spent thereon sent at stated periods to the office by the chief draughtsman, forming the basis of the charge through the Cost Journal. The establishment expenses and interest on capital other than that invested in plant cannot, however, in practice, be considered as forming part of the cost of any particular article. There is no advantage in distributing these items over the various transactions or articles produced.* They do not

* "When investing his capital in providing the means of carrying on an undertaking, the business man looks to being recouped by the price obtained for its various products; and he expects to be able, under normal conditions, to charge for each of them a sufficient price, that is, one which will not only

vary proportionately with the volume of business. A large increase in the value of orders received would not necessitate a like augmentation of the office staff, nor would a sudden and serious falling off in trade enable a firm to effect an immediate or proportionate reduction of general expenditure. The expense of selling and distributing or marketing is not part of the cost of manufacture. The establishment charges are, in the aggregate, more or less constant, while the manufacturing costs fluctuate with the cost of labour and the price of material. To distribute such charges over the articles manufactured would therefore have the effect of disproportionately reducing the cost of

cover the *special*, *direct*, or *prime cost*, but also bear its proper share of the general expenses of the business, and these we may call its *supplementary cost*. These two elements together make its total cost."—Professor Alfred Marshall, "Elements of Economics of Industry." Macmillan & Co.

Professor W. J. Ashley, M.A., Dean of Birmingham University, has kindly called our attention to the point that in the fifth edition of this work we seemed specifically to exclude Establishment Expenses and Interest as items in the cost of production. We take the opportunity presented by a new edition of stating our views on these points in somewhat greater detail, and thereby preventing the ambiguity to which the Professor alluded. He quite rightly points out that these charges must be elements in the cost of production in the wider sense in which we use that term in other parts of the work, and that the economists also include them in that term. We did not mean to convey that Establishment Expenses and Interest were not elements in the cost of production of the aggregate of the commodities manufactured. What we desired to point out was that, from the commercial standpoint of a manufacturer desirous under competitive conditions of obtaining business data on which he could act as to the price of the product, Establishment Expenses, and in some measure Interest, would not be regarded as items in the cost of production of particular commodities in so far as it regulates price. The reason for this view is set out in the text.

Interest on the capital invested in machinery is, however, we think, properly and usefully chargeable for, and to, each machine, and thereby to the cost of the particular articles produced. Unless it is so concluded, it is not possible to accurately compare the respective costs of different machines or processes.

Karl Marx, not ineptly, described machinery as congealed labour. A distinctive feature of such labour is that it does not give all its output at once, but requires time for the utilisation of its advantages. The element of cost in

each with every increase, and the reverse with every diminution, of business. Such a result is greatly to be deprecated as tending neither to economy of management nor to accuracy in estimating for contracts. The principals of a business acquainted with its details, including its costs, can always judge what percentage of gross profit upon cost is necessary to cover fixed establishment charges and interest on the capital used in the business other than that invested in machinery. It has been urged by some accountants that some portion of the establishment expenses should be added to work in progress, as the indirect expenses incurred are as much an increase in the value of the goods partly manufactured as are the wages and materials themselves; but, as previously pointed out, establishment expenses do not vary in like manner or in like proportion as the wages

time in these cases creates the interest charge, which must be included in Machine Cost, not only for costing purposes, but to enable proper comparison to be made as to relative cost of machine and manual labour for particular purposes.

In considering the results of his business, a manufacturer recognises that profit does not start until interest has been earned on the capital employed. Until interest has been earned the use of his capital in manufacture is not economically justified, and in the ultimate analysis of cost as contrasted with an analysis for competitive trade purposes, interest necessarily enters. In an able article, which appeared in the *New York Journal of Accountancy* (reprinted in *The Accountant* of June 24, 1916), Mr. George O. May gives various "Reasons" of a practical character "for excluding Interest from Cost." He points out the difference between loan capital and invested capital, and, *inter alia*, submits "that it is better to leave capital investment out of account altogether, than to take it into account on a basis that does not even represent the true cost of capital." Mr. May further points out that if the charge is on the basis of pure interest, that "means for compensation for the *use* of money, but not for the risk to which it is subjected . . . the risk is by far the more important element." *The Accountant* of June 29, 1918, contains a reprint of an exceedingly interesting thesis submitted at the November (1917) examinations of the American Institute of Accountants by Edmund C. Gaux, C.P.A., on "Relation Between Interest and Manufacturing Costs."

and materials account in consequence of some particular piece of work in progress.

Owing to the diversity of methods of dealing with the matters under review, it has not been thought advisable to complicate the Cost Ledger (Specimen No. **Specimen Cost Ledger.** 34) by the addition of one or more columns to meet the requirements of any particular mode of allocating the indirect expenses, especially as no difficulty will be experienced in adapting the book to suit any system of taking out the cost that may be decided upon, provided the methods of booking the cost of labour and material, which are described in the previous chapters, be adhered to. In many cases, however, it will suffice simply to enter the percentages of indirect factory expenses and depreciation at the end of each account in the Cost Ledger. In the consideration of this matter it has to be borne in mind that in many cases there is a point in manufacture, or in some of the processes of manufacture, at which increase of work means increased cost of product consequent upon the necessity of resorting to overtime to meet a temporary pressure, or to many other causes, or owing to the need of augmenting machinery without having at once sufficiency of work for the new plant.*

To ensure consideration of the question of what economies are practicable in construction or manufacture, the

* Many of these were well set out by Mr. W. R. Hamilton, F.C.A., in a paper on "The Cost of Production in Relation to an Increasing Output." They are also referred to by Professor T. N. Carver in his article, "A Suggestion for a New Economic Arithmetic," who points out that in the United States the new "expert, called by some mischance the production engineer, is also an accountant, but is more than that. He is really a consulting economist. He is an accountant who knows, to begin with, the general economic principles which make for the greatest efficiency, and who can therefore so direct the accounting of the establishment as to find out whether each and every branch is returning its maximum profit. . . . He deals principally with the commonplace economic principles of marginal productivity and marginal cost."

heads of the designing and manufacturing departments should be advised of the cost of each order when it is completed in such detail as permits of a comparison being instituted between the actual—as referred to in the concluding paragraph of this chapter—and estimated cost. As a matter of convenience the estimate forms may include columns for the actual costs to be inserted when known. The employer should be advised of the difference between actual and estimated costs in such detail as he may require. The manufacturer should not be entirely dependent upon historical costs or records of cost under conditions that have changed. For these and other reasons, it is desirable that a Comparative Cost Register should be compiled, showing the difference in cost of making the same or similar articles under differing conditions of time, material, parts, or quantities. This Register will be specially serviceable in preparing estimates and quoting for orders, and permits of the necessary adjustments in quotations consequent upon the increase or decrease in the market price of material. It should also record the buying or market price of the material at the time such material was used, so that comparison can be instituted between that price and the price at which it was purchased for and charged out of store, and information obtained as to the relative advantage or disadvantage of the original purchase. In some cases the Comparative Cost Register is superseded or supplemented by the cost and its constituent elements being recorded in graphic form on a chart which shows comparisons by means of curves. The variations shown from time to time in the cost can thus be converted in terms of quantity, prices, kind and condition of material, machine usage, and other expenses.

Should the multiplicity of the manufacturing operations, or the extent of the business, involve departmentalisation

on a scale which renders separate departmental Cost Ledgers necessary or desirable, the totals of the accounts in those Ledgers might be transferred to the Cost Ledger under the respective Order Nos., by means of a Departmental Transfer Book, which fulfils the same function between the various manufacturing departments as the Transfer Book, already alluded to, performs as between Stores and Stock. In such case the Cost Ledger would give in summarised form the aggregated cost in the various departments of the component parts manufactured, whilst the Departmental Cost Ledgers would give all such detail as might be required to elucidate any differences between actual and estimated costs of any process or part in any department. If in the Departmental Cost Ledgers the standing or establishment charges of the department are apportioned over the orders, transfers from one department to another of finished parts or worked up material will be on the basis of shop cost of production. If it be thought desirable that departmental transfers should be on a profit basis, the procedure with regard to Stock Orders, as previously described, is applicable. A profit basis may in some cases be necessary to kindle departmental emulation, but there is in its operation a latent risk of stock values being eventually increased to more than the aggregate cost of production in the different departments, and profits not yet realised by the sale of the article manufactured being to some extent anticipated. This risk may not, even in an extensive business, be a large one, unless the stocks at balancing periods show an increase as compared with corresponding periods. In such cases it may be desirable to open an Adjustment Account, recording the difference between prime cost and cost of production in the different manufacturing branches.

For some time past there have been cases in which

work has been undertaken in connection with the production of special articles, or the carrying out of special work in which the two parties to a contract have recognised the difficulty of fixing in advance a price, or the amount to be paid, and the order has been accepted on the basis of cost, plus such an amount as by way of percentage or otherwise as would, it was thought, remunerate the manufacturer or contractor. During the European War this form of contract, known as the cost plus-contract, was largely adopted by various Government Departments. In such cases the ascertainment of departmental costs becomes of special importance, and it becomes specially necessary to see that all working costs are divided equitably between the departments.*

In the diagrams, as in the text, we have shown how the Cost Ledger converges into the General or Commercial Ledger. The detailed totals in the Cost Ledger or Ledgers can thus be used in verification of the totals of the various generic accounts in the Commercial Ledger, or *vice versa*, as shown in Diagram No. 3. If it is thought desirable to apply the self-balancing principle, a "Cost Ledgers Account," or a Manufacturing Account, can be opened in the Commercial or General Ledger, and a "General Ledger Account," or Works Account, in the Cost Ledgers. These accounts, although having independent origin, would through the journal be found to balance each other, and each set of books would be self-contained and self-balanced. Diagram No. 4, an expansion of Diagram No. 3, shows the application of this principle.

Though it is essential for accounting purposes, the record of "actual" cost is, from the point of view of an industrial economist, not an actual, but only an "apparent" cost.

* Some interesting data on this subject appeared in the *Accountant's Journal of New York*, "Overhead Distribution for Cost plus Contract," see *Accountant*, November 23, 1918. Frank G. Sudman.



DIAGRAM III.

SHOWING THE RELATION OF THE BOOKS AND FORMS USED IN CONNECTION WITH PRIME COST

(The numbers where shown, correspond to the specimen rulings.)

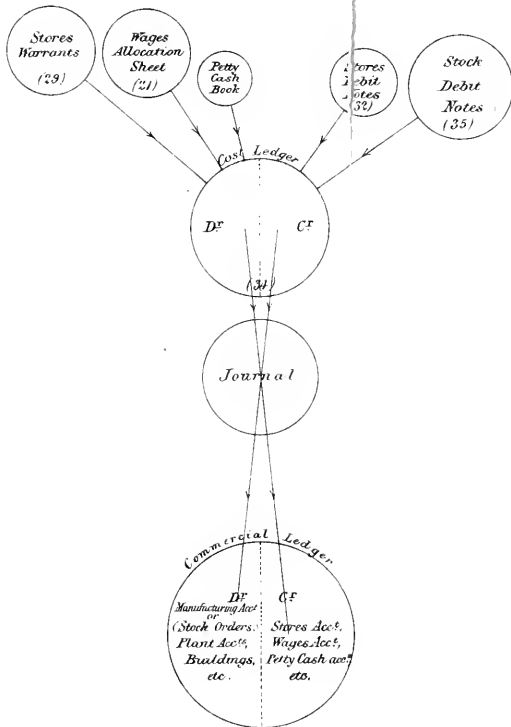
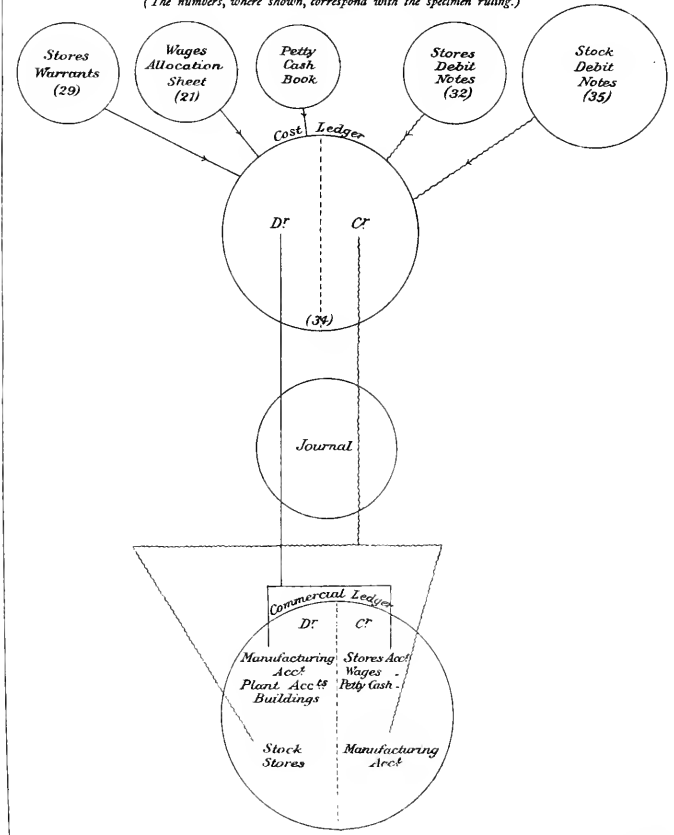




DIAGRAM IV.

SHOWING THE RELATION OF THE BOOKS AND FORMS USED IN CONNECTION WITH PRIME COST
WHEN THE COST AND COMMERCIAL LEDGERS ARE SEPARATELY BALANCED.

(The numbers, where shown, correspond with the specimen ruling.)



From this point of view, the "apparent" cost is the cost under the conditions existent at the time, and is dependent upon a number of causes, such as full employment at the factory and condition of plant.

By some writers* the true cost is only ascertainable by deducting from the accountant's "actual"—which is the industrial economist's "apparent"—cost the expenditure which would not have been incurred save for error in manipulation or use. As distinguished from true cost, there remains the third of the comparable costs, known as "standard" cost, which should represent cost when production is at the highest stage of efficiency attainable under existing conditions.

* In particular, Mr. F. J. Knoepel, C. P. A., in "Fundamentals of Accounting for Industrial Waste." *Journal of Accountancy*. New York, *Accountant*, January 25, 1919.

CHAPTER VI.

FIXED CAPITAL AND DEPRECIATION.

IN this chapter we purpose dealing with the accounts pertaining to instruments of production of a more or less permanent character. These, as Mill pointed out, “produce their effect, not by being parted with, but by being kept; and the efficacy of which is not exhausted by a single use. To this class belong buildings, machinery, and all or most things known by the name of implements or tools. The durability of some of these is considerable, and their function as productive instruments is prolonged through many repetitions of the productive operation. . . . Of fixed capitals, some kinds require to be occasionally or periodically renewed. Such are all implements and buildings; they require, at intervals, partial renewal by means of repairs, and are at last entirely worn out, and cannot be of any further service as buildings and implements, but fall back into the class of materials. In other cases the capital does not, unless as a consequence of some unusual accident, require renewal; but there is always some outlay needed, either regularly or at least occasionally, to keep it up.”*

* “Principles of Political Economy.” J. S. Mill. Book I., chap. vi., par. 1. Longmans, London.

In law, a more restricted definition of the term fixed capital is applied than is the case in economics. Legally, fixed capital is property acquired and intended for retention and employment with a view to profit, as distinguished from circulating capital, meaning property acquired or produced with a view to sale or re-sale at a profit.*

Inasmuch as the profit or loss of an undertaking for any period is not simply the difference between the receipts and expenditure during that period, nor, save in exceptional cases, the current value of plant the amount which has been paid for, or expended upon it, the question of the depreciation of factories and of plant must be regarded as a matter of paramount importance in the determination of the lucrativeness or otherwise of a business, and in the valuation of properties. By depreciation is meant decrease in financial value, whilst deterioration implies material or mechanical processes. Many different views prevail as to the best way of dealing with these

**Deprecia-
tion.**

**Variety of
views on the
subject.**

questions, and owing to trades and processes of manufacture varying widely it is impossible to lay down invariable rules. Questions as to the particular practice to be followed in any individual case must, to a large extent, be left to the judgment of those most intimately acquainted with the conditions of the business, for, as has been pointed out by Professor Marshall, "almost every trade has its own difficulties and its own customs connected with the task of valuing the capital that has been invested in a business, and of allowing for the depreciation which that capital has undergone from wear and tear, from the influence of the elements, from new inventions, and from changes in the course of trade. These two last causes may temporarily raise the value of some

* Buckley on "Companies" (9th edition, p. 653). This definition was adopted by Alverstone, C.J., in *Galloway v. Schill, Seebohm, & Co.*, 1912.

kinds of fixed capital, at the same time that they are lowering that of others. And people whose minds are cast in different moulds, or whose interests in the matter point in different directions, will often differ widely on the question what part of the expenditure required for adapting buildings and plant to changing conditions of trade may be regarded as an investment of new capital, and what ought to be set down as charges incurred to balance depreciation, and treated as expenditure deducted from the current receipts, before determining the net profits or true income earned by the business.”*

Some examination of the fundamental principles to be observed in regard to charging up machinery costs and “writing off” is obligatory in considering the methods of ascertaining costs.

Exhaustive examination of subject impossible.

The question of maintenance is very closely associated with that of depreciation, which includes not only wear and tear, but other constituent causes, such as weather exposure, contributory to expired capital outlay. There are five main factors which enter into the determination of any

Five factors in the determination of depreciation.

rule for arriving at the deterioration which has taken place: 1st. The cost of an object, be it a building, machine, or other asset. This may be either the cost price or, in the case of the transfer of an established business, the estimated value of the object. 2nd. Its estimated tenure of life, regard being had to its functions and the conditions under which they are performed, including therein volume, character, and nature of work, the material on which it is employed, and the personal equation or care taken by operators or attendants in the care and management of machinery, especially when, owing to stress of work, its operations are controlled by those who have had but little

* “The Principles of Economics.” Alfred Marshall.

experience of similar plant. 3rd. The extent and value of the renovation or restoration received by it from time to time. 4th. Its value in use, or its present earning power, relatively and comparatively, to other instruments of production used for similar purposes. 5th. Its residual value, either as scrap or as an implement which, though possibly applicable to other uses, is no longer fit for its original purpose. This residual is generally lower in proportion to original cost, if the plant or machine is specially constructed, than if it is fit for general use.

In an interesting lecture on "Works Accounting," by Mr. R. N. Barber, A.C.A., delivered before the Manchester Chartered Accountants Students' Society, after quoting these five main factors, he said, "To these five I would frequently add a sixth, obsolescence, unless it is intended to be included in (2) or (4). In some industries there are peculiar forms of obsolescence that have nothing to do with the machinery itself. A change of taste or of fashion might completely destroy the demand for the particular commodity produced by a machine, or a rise in the price of raw material might have the same effect. Such possibility of obsolescence is entirely different to the fear of improved methods, etc. (the usual meaning of the term), which would have the different effect of cheapening production. Now any of these last five factors might materially alter the annual cost of two machines, of which the first factor, the capital outlay, was the same, and when it is further remembered that one machine in a shop might be, on the average, in use two or three times as long as another machine of the same cost, it will be realised how very different the charges should be to the various jobs on which they are employed." For practical purposes the sixth factor referred to by Mr. Barber can usually be considered with the second or fourth factor, but it does not

seem possible in all cases in practice to limit the term to the diminution in value which arises solely from use. The effect of supersession of machinery can best be considered when dealing with the question of periodical valuation of plant.*

The usual methods of dealing with depreciation include either the yearly provision of—

- (1) A fixed sum.
- (2) A fixed percentage on the original value.
- (3) A fixed percentage on the diminished value.
- (4) A sum to cover repairs, renewals, and depreciation.

Whatever rule is determined upon, it is important that it should be consistently adhered to for a term of years in order to avoid the accounts of particular years being treated abnormally, which, in the case of joint-stock companies, whose shares are constantly changing hands, would lead to much injustice being done to individual proprietors.

In many manufacturing businesses the rough-and-ready method is adopted of charging to capital, in addition to the original cost, the cost of all renewals, alterations, and extensions of buildings and machinery; and, without any allocation of machinery costs to the articles manufactured or produced, to debit profit and loss account in respect of depreciation with a percentage of the total amount in the Ledger under

**Rule
adopted
should be
adhered to.**

**The rough-
and-ready
method.**

* In a paper read on 9th January 1917, before the Scottish Section of the Institution of Electrical Engineers, by Messrs. Cook and Gill, on "The Principles Involved in Computing the Depreciation of Plant," the authors state that by them the term "depreciation" is intended to cover (1) Provision for the diminution in value of plant in place and working (that is, its loss in value to the owner as a continuing plant), by reason of causes outside his control, such as age, wear, and accidents. This provision they call "Renewals." (2) Provision to enable the owner to take plant out of commission before its physical life is exhausted in cases where, from either progress of the art or growth of the business, it is economically advisable to do so (that is, by reason of causes within his control). This provision they call "Improvements."

those heads. In few factories, however, could a general rate of depreciation produce accurate results. Rates of depreciation naturally vary with the class and character of the machinery and plant, and their life and residual value. The rates are based on the original cost, or on the yearly reducing balance of the account. In the latter event a higher percentage rate has necessarily to be used. The "Comparative Depreciation Tables," compiled by Mr. Lawrence R. Dicksee, set out the equivalent rates side by side, and in practice are of considerable use.

**Repairs
charged to
capital.**

When, as in some cases, even the current repairs are charged to capital, a proportionately larger percentage should be written off annually for depreciation. The theory of the double account system, which is generally used in connection with railways, gas, water, electric light, tramway and similar undertakings, whose assets are commonly described as of a permanent character, is that the capital, having been raised for the purposes of a permanent undertaking, should be kept in a separate account apart from the revenue raised therefrom, that fluctuations in value of capital assets should be disregarded, that they should continue to stand at cost, and that profit was the excess of income over expenditure, without regard to the position of the capital account.

In some cases proprietors are content to charge their profit and loss account with an estimated fixed sum yearly for depreciation, and they include under this term repairs and renewals. The amount so charged they credit to a Depreciation Account or Fund, and debit the account with the amount expended in repairs and renewals.

The principle of an annual average charge is defensible on some grounds, but if applied to an account which includes such dissimilar factors as depreciation, renewals,

and repairs, the ratio of the fixed amount applicable to depreciation will vary with the yearly increase or decrease in the amount actually spent on repairs and renewals. This would be obviated by keeping the Depreciation Fund and the Repairs and Renewals Fund separately. In the case of the latter fund, the cost of repairs and renewals will naturally be lighter in the earlier than in the later years, and in these years a credit should be arising on the account, owing to the cost not amounting to the fixed sum charged. Unless repairs and renewals are intentionally postponed in order that the account may be kept in credit, the sufficiency or otherwise of the charge under normal conditions, and in the absence of any accident, will manifest itself in the credit balance in the fund.

In some undertakings no cognisance is taken of depreciation in the accounts. In the case of most railways, for instance, the deterioration of the plant is taken to be adequately and fairly provided for by the current expenditure upon repairs and renewals which is debited to revenue account.* This practice is defended on the ground that by the very nature of railway property the repairs and renewals must be at least equivalent to the depreciation, and that an effectual check against any starving in maintenance is furnished by the certificates which the heads of the spending departments periodically give as to the condition of the permanent way, plant, tools, buildings, and rolling stocks. Such a system may possibly prove unobjectionable when, an undertaking having been in operation for a number of years, a relation has been established between the expenditure and the deterioration; but there is always a danger that during its earlier years, when expenditure for repairs, renewals, and extensions is not so imperatively called for as after some

* In the case of railways in the United States of America, depreciation accounts are prescribed by law in respect of the rolling stock, machinery, and equipment.

years of working, the profit and loss account is not adequately debited with depreciation ; and even if this be done, there is nevertheless the risk of the accounts of particular years being prejudiced. It is doubtful, also, whether the desire to maintain dividends and to show an average expenditure per mile does not lead, in the case of railway companies, to only such work being done during the half year as will approximately cost the average amount. In the case of water companies likewise, the item of depreciation forms no part of the accounts.

Case of water companies.

But water companies are allowed by Act of Parliament to place to a reserve fund surplus profits to the extent of one-tenth of the capital, and as renewals are paid for out of profits, it follows that any abnormal charges in respect of deterioration are indirectly met out of this reserve fund ; consequently during the first years of working, when renewals and repairs are insignificant, and no reserve fund has been formed, there is a tendency to relieve revenue account of its fair proportion of charge for wear and tear. In general, it may be stated that unless considerable additions and extensions are constantly made, the system of charging all repairs and renewals to revenue, but making no allowance for depreciation, will not in the long run prove satisfactory. Unless adequate provision is made a time must arrive when, owing to some of the machines and tools having become wholly obsolete, or the lease of buildings having expired, an amount will have to be debited to Profit and Loss which should in strictness have been borne by

Distribution of depreciation over life of object.

previous years. In this way some years are made to appear unduly lucrative at the expense of others, instead of the depreciation being charged equally over the number of years constituting the life of the object, in direct proportion, if possible, to the

actual deterioration incurred in each period. This is always at least approximately possible.* In certain cases only can maintenance be said to balance depreciation. "In any particular building, machine, or appurtenance, decay or wear of some sort must take place in the course of time, and repairs, in order to compensate fully for the decline in value, must take the form of renewal. This being the case, the absolute replacement of some portion of the plant every year may thus maintain an average aggregate value. In only two kinds or classes of plant, however, can such an exact balancing of loss by repairs and renewals be ventured on; one, where the plant wears out so quickly as to need replacement at short intervals, affording constant proof, by the mere continuance of working, that not only the earning power of the factory is maintained, but also the capital value; and in a second class, that of undertakings so large and permanent as to afford a wide average of deterioration and renewal over the whole plant."† It is worthy of note, that even in the two cases referred to, Mr. Matheson speaks with some hesitancy, and alludes to such a mode of procedure as a venture. There is the certainty of plant deteriorating in time, and always the risk of plant gradually becoming obsolete, even though kept in good repair. In some cases it is desirable to provide for obsolescence by means of a general reserve, and not to consider it as a factor in depre-

* Some interesting details of the evolution of methods of charging depreciation in the accounts of Telephone Companies in the United States are given by C. G. Dubois, Comptroller of American Telephone and Telegraph Company, in a lecture, "A Brief History of Telephone Accounting," delivered to the students of the Agnes Tuck School of Administration and Finance on February 10, 1913.

† "The Depreciation of Factories, and their Valuation." Matheson. London. Spon.

ciation. Some check in the sufficiency of this provision when this course is adopted is afforded by charging to this account the cost of all replacements due to supersession.

In some instances the amount charged to revenue account for depreciation is a fixed sum, often arrived at by charging an equal proportion of the cost against each year of the working life of the object, or by an arbitrary percentage on the book value, or by way of a constant percentage fixed at a rate calculated to reduce the asset to its residual value in a prescribed term. In others it varies according to the business effected, or to the balance remaining to profit and loss account, or is regulated by the desire of the firm or its managers, either on the one hand to show a large profit, or on the other to add to the stability of the concern. In comparatively few establishments, however, is the endeavour made to approximate systematically the amount charged to revenue for depreciation, to the actual deterioration which has taken place, and still more rarely is it attempted, when the actual depreciation has been ascertained, to allocate it to the various departments in which it has been incurred, or more accurately, to the various operations which have been carried on.

Other methods in vogue.

Only rarely that actual deterioration is charged.

The direct way of determining the depreciation or appreciation of the assets of an undertaking would *prima facie* appear to be by means of a revaluation of all the properties at periodical times. In the case of trades in which the wear and tear of plant is proportionate to the work done this course would have the advantage of charging fairly the deterioration due respectively to a period of brisk trade and to a time of depression, by manifesting in the former period a greater degree of wear and tear due to a larger volume of business, or to time contracts compelling a resort to overtime, or in times of

Periodical valuation the direct method.

extreme pressure such as may arise during war, the extra wear and tear of machinery that may arise by machines being worked by unskilled labour, or by labour less skilful than usual; while in periods of depression a smaller amount would obviously be chargeable for depreciation, much of the machinery and plant having probably stood idle. But this method would in the majority of trades lead

Disadvantages of this method.

to such enormous fluctuations in the profit and loss account, especially if the periodical valuation was based upon the market price of the assets taken singly, and not simply upon their value as integral portions of a "going concern," that, except in a few trades, it would be impracticable. This would especially be the case when raw material, subject to market fluctuations, formed a large proportion of the plant and stock-in-trade. Such a method as an annual practice would often be a fruitful source of confusion and error, although of great benefit if taken at five or seven year periods, or on some special occasions such as the sale of the business. In short, to write off only such portion of the cost of the plant as represents the apparent deterioration that has taken place would be fallacious.

To write off only manifest deterioration fallacious.

Although machinery or plant may show no signs of diminished value or loss of earning power, yet its term of life and its value in the market must be lessened by lapse of time. A periodical survey of all buildings, plant, etc., is, however, very important, and would serve, if for no other purpose, as a very valuable check upon the system of calculating depreciation that may be adopted. Such a survey is of additional importance in view of the great advance that has been made in recent years in many classes of machinery, which renders desirable the supersession of machines of old types though in perfect working order by machines of a new and

often more costly type, in the interests of economical working. In such cases the life rate, unless based on a short expectation of profitable use, will leave a substantial sum to be dealt with when the machinery is scrapped.

A periodical valuation of the assets, as the basis of a depreciation rate, however, raises considerations of very great significance, such as the question of the interdependence of the revenue and capital accounts, and the question of how far a loss or profit on capital account, *i.e.*, a diminution or increase in the realisable value of any of the assets, should affect the profit and loss account. These are points of considerable interest, and deserve to be discussed to a greater extent than the limits of this work will permit. The following observations by a leading authority on the law relating to joint-stock companies are, however, very apposite :—

“Capital may be lost in either one of two ways, which may be distinguished as loss on capital account, and loss on revenue account. If a ship-owning company’s capital be represented by ten ships with which it trades, and one is totally lost and is uninsured, such a loss would be what is here called a loss on capital account. But if the same company begins the year with the ten ships, value say £100,000, and ends the year with the same ten ships, and the result of the trading, after allowing for depreciation of the ships, is a loss of £1000, this would be what is here called a loss on revenue account.

“Where a loss on revenue account has been sustained, there is of course no profit until that loss has been made good either by set-off of previous undivided profits still in hand, or by profits subsequently earned. But until the case of Neuchatel Asphalte Company the question was open whether a company under the Companies Acts, which has lost part of its capital by loss on capital account, can con-

Profit and loss on capital.

Opinion of Lord Justice Buckley.

tinue to pay dividends until the lost capital has been made good.

“That case showed the true principle to be, that capital account and revenue account are distinct accounts, and that for the purpose of determining profits you must disregard accretions to or diminution of capital. Suppose I buy £100 Consols, at 97, and at the expiration of a year they have fallen to 94, is my income £3 or nothing? If nothing, then if at the expiration of the year they had risen to par, my income would by parity of reasoning have been £6, not £3. Is the result affected by the question whether at the end of the year I am or am not about to sell my Consols? Suppose a tramway company lays its line when materials and labour are both dear, both subsequently fall, and the same line could be laid for half the money, and as an asset (independent of deterioration from wear) would cost for construction only half what it did cost. Is the company to make this good to capital before it pays further dividend? If so, then if the cost of materials and labour had risen after the line was laid, might not the company have divided as dividend this accretion to capital? Upon such a principle dividends would vary enormously, and sometimes inversely to the actual profit of the concern.

“If revenue account be treated as a distinct account, these difficulties disappear, and subject to the difficulty which must be encountered of discriminating between revenue charges and capital charges, a safe and intelligible principle is arrived at. The creditors of the company are entitled to have the capital account fairly and properly kept; but they are not entitled to have losses of capital on capital account made good out of revenue. It is no doubt true, that before arriving at revenue at all there are payments which must be made good to capital, on account of capital wasted or lost in earning the revenue. For instance, in the common

case of leaseholds, which are a wasting property, the whole of the rental will not properly be income; in the case of colliery properties, the difference between the price at which the coal is sold, and the cost of working and raising it, will not all be income, for there must also be a deduction made in favour of capital representing the diminished value of the mine by reason of its containing so many less tons of coal; in the case of a tramway company, you will not have arrived at net profit before you have set apart a sum to make good deterioration. But when all proper allowances have thus been made in favour of capital, the balance is revenue applicable for payment of dividend." *

The reports of the Neuchatel case (C. A., 1889, 41 C. D. 1) show that the articles of association of the company expressly provided that it should not be necessary for the directors to provide for the waste of the assets before the declaration of a dividend.

In the case of *Bolton v. Natal Land and Colonisation Company* (C. D., December 1891), an assumed rise on the value of fixed assets was set off against a decrease in the value of floating assets, and the point to be decided by the Court was whether it was necessary to write down land to its true value before declaring a dividend, and it was held that a company may declare a dividend out of current profits without being obliged to show that its capital is intact. In *Verner v. The General Commercial and Investment Trust, Ltd.* (1894, 2 C. 239), Lord Lindley drew a distinction between fixed and circulating capital, holding that depreciation of the former need not, but

* "The Law and Practice under the Companies Acts." H. Burton Buckley. London: Stevens & Haynes.

In some earlier cases, *e.g.*, *The Ebbw Vale Steel and Iron Co., Ltd.*, and *Dent v. London Tramways, Ltd.*, the extreme view that no profits were available for distribution until lost capital had been replaced, seems to have been taken.

depreciation of the latter must, be charged to profit and loss.

In *Wilmer v. McNamara & Co., Ltd.* (Chancery, April 1895), involving the depreciation of leaseholds, it was also held that a company cannot be restrained from declaring a dividend out of current profits, because no provision has been made for the depreciation of fixed assets.

In the case of *Bond v. The Barrow Haematite Steel Co., Ltd.*, money invested in land, mines, and furnaces which were abandoned was considered as circulating capital, and as analogous to buying ore in advance, and it was held that the directors did right in making good the loss out of profits.

The judgment in the case of the *National Bank of Wales v. Cory* does not run counter to these decisions; but the Lord Chancellor (Lord Halsbury) stated that he must decline to express an opinion not called for by the particular facts before the tribunal, and that when the question of whether dividends were properly paid came before the Court, he foresaw that many matters would have to be considered by men of business, which were not altogether familiar to a court of law.

The question of payment of dividend out of capital surplus has arisen in two leading cases.

In *Lubbock v. The British Bank of South America, Ltd.* (2 Ch. D., April 1892), it was held that if a company's articles of association so provide, a profit made on the sale of a part of the undertaking is available for dividend. In connection with this case, the important distinction between capital used in a concrete, and in an abstract sense as "capital values" should be pointed out. It was suggested that since the profit made was derived from concrete capital assets of the bank, it could not be distributed as income, but the decision of the Court showed that it was the

statutory capital or capital values, and not concrete assets which had to be conserved, and provided the paid-up capital was represented by sufficient assets, there was no return of capital to the shareholders. In *Foster v. The New Trinidad Lake Asphalt Co., Ltd.* (C. D., November 1900), it was held that an unexpected appreciation in the value of assets taken on by a company at its formation is not profit available for dividend, even though the asset in question be a book debt.

From these decisions it would seem that legally—

Fixed capital need not be maintained intact.

Dividends may be paid without providing for depreciation on fixed assets and despite loss of fixed capital.

Floating or circulating capital must be maintained intact, or the amount by which it is diminished, charged against revenue.

Dividends cannot be paid before a loss on revenue is made good.

An analogous point arises in connection with assessments for rating purposes. Following the *Cambridge Gas Co.* case in 1838, many English Courts have for these purposes allowed deductions for depreciation, even where, as in the *London, Brighton and South Coast Railway Co.* case in 1851, sums have not been set aside in the accounts for depreciation.

A similar view has under like circumstances been taken in the Courts of the United States. Thus, in a case which came before the Railway Commission of Wisconsin recently, the commissioners stated that depreciation may be described as an amount that must regularly be set aside to cover wear and tear in order to keep the original investment value. Depreciation was, the commissioners decided, an operating expense that should ultimately be borne by

consumers or users, and that when it is so borne it should be set aside until needed for the renewal of worn-out or useless parts of the plant.

Morawetz, in his book on "Private Corporations," expresses a general view in stating that a large number of cases decided in the English and United States Courts, show that in determining whether a company is entitled to pay a dividend to its shareholders, the property acquired for permanent use in carrying on business may be valued at the price actually paid for it, although it could not be sold again except at a loss; even although the business of the company should prove less profitable than was anticipated and the value of the whole concern, and consequently the value of the shares representing it, should greatly depreciate in actual value, it would not be necessary to accumulate the profits until the depreciation had been made up and the value of the shares again raised to par.

All that is required is, that the whole capital originally contributed by the shareholders shall be put into the business and kept there, that no part of it shall be taken out again, directly or indirectly, and given back to the shareholders.

While there are some cases which would seem to indicate that dividends may be declared even though the ordinary repairs have not been made to the plant, it seems to have been held by the majority of the Court decisions that so long as the actual things constituting the capital of the corporation be not paid out to the shareholders, and ordinary repairs are made so that the plant is kept in good working condition, dividends may be paid even though depreciation has not been taken care of.

From the economist's point of view, if at a given period the realisable value of all properties, after liquidating all liabilities, is in excess of the amount of subscribed capital, such surplus, whether the gain has been made on

capital account or revenue account, constitutes profit; while the amount by which realisable assets fall short of the liabilities, including the subscribed capital,

The practical view of the matter. must be considered as loss. In practice, however, the business man has to distinguish between profits which arise from trading and those due to increase in the value of fixed assets, for the withdrawal of the latter from the business would correspondingly decrease working capital, and such profits are thus not available for

Profit and loss account. distribution. So long as a business is a going concern, it would probably be inadvisable for the revenue account to serve the purpose of an index of the fluctuations in the market value of the constant or fixed assets essential to the carrying on of the business, for in such a case the revenue account would oscillate perhaps from a large profit one year to a large loss in the next,

Sinking fund. although the nature, volume, or lucrativeness of the current business may have remained without abnormal change. With a view to provide against an eventual loss in the realisation of an asset the value of which tends to decrease, it would probably be judicious to establish a sinking fund by debiting the revenue account annually with a fixed percentage to cover all contingencies. This would also apply to plant which is not worn out before it is replaced by improved machines. Similarly, if the asset is improving in value we do not

Reserve fund. recommend that the increment should be placed to the credit of profit and loss account, but that it be debited to the account of that asset and credited to a reserve fund opened to provide for any future diminution in its market value. If there is a sinking fund, the amount might be placed to its credit.

Although it does not seem practicable to lay down a universal rule that a loss on capital must be made good

before further dividends, if earned on profit and loss account, can be distributed, there are cases in which it is obviously necessary that this set-off should be made. In the case already referred to of the shipping company with ten ships, one of which is uninsured and is lost, inasmuch as the profit and loss account has not—from what must be assumed to be motives considered as economical—been charged with the cost of insurance, and the risk of loss has been undertaken, that account must as a consequence bear the loss when it is incurred. Thus the account named would bear the total loss of one ship and the depreciation of the remaining nine. Indeed, a loss which might have

**Insurance
against
losses.**

been provided against by insurance, or one which underwriters will not insure except at a premium so high that the firm prefers incurring the risk to paying the cost of insurance, if not provided for by the creation of a reserve fund, is always a fair charge to profit and loss account. The question whether or not the properties of a firm are insured against fire has always to be considered in estimating the liabilities of a concern. There are many points connected with effecting an insurance, the non-observance of which may invalidate the policy, and by omitting to examine the conditions of their fire policies a firm may find that when part of their buildings or stock has been destroyed by fire they are not entitled to indemnification by the insurers.

The Income Tax Acts also have an important bearing upon the depreciation and valuation of assets, and no

**Income Tax
Acts.**

method of dealing with large assets of fluctuating value should be decided on without due regard being had to the provisions of these Acts. Under them everything in the nature of property, which produces or is capable of producing, or itself consists in, an

annual income or revenue, is subject to income tax. In view of the complexity of the subject, and of the legal provisions with regard to it, being scattered through various Acts of Parliament, previous editions of this work have, in an Appendix, contained a summary of these provisions. In 1918, however (8 & 9 Geo. V., Chapter XL.), the provisions of the series of Acts were embodied in an "Act to consolidate the enactments relating to Income Tax," and the facilities afforded by the Appendix referred to being now made available by the Consolidation Act, an Appendix on the subject is not included in this edition.

The principle of treating depreciation as a charge on the business, and not as a charge which may or may not be met by a provision out of profits, is as applicable to private undertakings as to limited liability companies. In a case (*in re Crabbtree*, 106 L.T.Rep. 49) in which a testator directed that his business should be carried on, and the profits arising therefrom paid to his widow, it was held that the trustees must charge a sum for depreciation before declaring profits, Mr. Justice Swinfen Eady saying: "But in the ordinary course of ascertaining the profits of a business where there is power machinery and trade machinery which is necessary in order to perform the work of the business, it is, in my opinion, essential that, in addition to all sums actually expended in repairing the machinery or in renewing parts, there should be written off a proper sum for depreciation, and that sum ought to be written off before you can arrive at the net profits of the business or at the profits of the business, and it is not profit until a proper sum, varying with the class of machinery, with the nature of the business, and with the life of the machinery, has been written off for depreciation."

CHAPTER VII.

MACHINERY USE.

HAVING dealt with the principles which necessitate charges for the use and depreciation of machinery being dealt with in the ascertainment of cost, we proceed with the consideration of methods enabling these charges to be allocated to the various processes or articles of manufacture. The procedure to be adopted with regard to lease redemption or amortisation does not call for lengthy consideration, but it is necessary to deal more fully with the charges for the use of machinery. These principles and their application were outlined for the first time in the first edition of this work, published in 1887. Since then special attention has been given by subsequent writers to this branch of the subject, and to them we are much indebted for valuable verification of the principles we advocated and their detailed consideration of the best modes of applying them. The extent to which in certain industries the use of machinery has supplanted or supplemented manual labour has strikingly manifested the need of considering mechanical labour or machinery use as an item of cost, to be ascertained in each manufacturing operation with as much detail, precision, and accuracy as the cost of labour and material.*

* "The enormous increase in the amount of capital permanently invested in manufacturing industries—"fixed capital," as it is called—correspondingly increases the "fixed charges" as an element in cost. Further, as machinery supplants labour a change takes place in the analysis of costs; the proportion

We then pointed out that the best way of arriving at a machinery hour-rate, which would include a provision for depreciation, was to take the life, that is the expectation of useful service, of a building or machine as the basis of the

The life of an object the best basis.

rate, modified by the other three factors, mentioned in the preceding chapter, viz., original cost plus interest, renovation, and residual value.

The method, however, is attended with some difficulties in the case of properties whose tenure, unlike that of leases, is not well defined, and also in the case of a newly established business, to which

Difficulties of this method.

the experience of other establishments has but little application. Should the nature of any particular business be

Advantages of this method.

such that the life of the appurtenances can be estimated with tolerable accuracy, this plan will be found to be the most scientific in its

operation; for although the life of an asset may vary with the surrounding conditions, in the same way as the life of a horse depends, *cæteris paribus*, upon the character of the work it performs, yet, if once the life of an asset has been determined—and a manager of a business which has been established for a time should at least be able to frame an approximate estimate of the durability of the various implements he employs—there will be no difficulty in allocating the depreciation to the various processes.

Leases for a definite number of years, or in perpetuity (leases renewable from time to time at the option of the lessee may be regarded as leases in perpetuity),

Leases afford good illustration.

afford a very appropriate illustration of the rule of basing the depreciation rate upon the life

of the object. In Inwood's "Tables for the Purchasing of

of fixed charges, oncost, and expenses grows, and the proportion of wages to total cost diminishes."—John Mann, jun., M.A.C.A., on "Oncost or Expenses" in the "Encyclopædia of Accounting."

Estates" there is a table recommended by Mr. Pixley,* which will be found useful in calculating the amount to be set aside annually under what is known as the Fixed Instalment or Straight Line system, to amortise a lease, and the table is also applicable to other properties, the life of which has been determined. Inasmuch as the table takes cognisance, and correctly so, of interest at the various rates shown, the Ledger account of the asset in question should be debited each year with interest at a given rate and credited with the corresponding amortisation rate shown in the table, until, at the expiration of the tenure of the lease or other object, the whole of the amount at which it stood in the books has been exhausted. The hypothetical Ledger Account (Specimen No. 38) of a five years' lease from the time of its purchase to its expiration will serve to elucidate the table referred to. The purchase price of the lease is taken at £4500, and interest is calculated at 5 per cent. per annum, which is of course debited to the lease account, and credited to profit and loss account, a correspondingly larger amount being debited to that account in respect of amortisation.

The amount which is debited each year to profit and loss account by way of amortisation, is arrived at by dividing the amount of the purchase price, £4500, by 4.329, the latter being the number in the 5 per cent. column of the table on the line corresponding to five years, that being the number of years over which the amortisation is to extend, and crediting the account each year with the amount so written off.

This procedure involves the charging against profits of a sum which will not be represented by any payment until the expiry of the lease, when the accumulated fund may

* "Auditors; their Duties and Responsibilities." By F. W. Pixley. London: Effingham Wilson.

LEDGER ACCOUNT, SHOWING THE AMORTISATION OF A FIVE YEARS' LEASE.
 (See page 148.)
 SPECIMEN No. 38.

| DATE. | DR. | £ | s. | d. | DATE. | CR. | £ | s. | d. |
|-----------------|-------------------------|------|----|----|-----------------|--------------------|------|----|----|
| Of purchase | To Cash, Purchase price | 4500 | " | " | End of 1st Year | By Profit and Loss | 1039 | 10 | " |
| End of 1st Year | To Interest at 5% | 225 | " | " | | Depreciation | 3685 | 10 | " |
| | | 4725 | " | " | | By Balance | 4725 | " | " |
| End of 2nd Year | To Balance | 3685 | 10 | " | End of 2nd Year | By Profit and Loss | 1039 | 10 | " |
| | " Interest at 5% | 184 | 5 | 6 | | " Balance | 2830 | 5 | 6 |
| | | 3869 | 15 | 6 | | | 3869 | 15 | 6 |
| End of 3rd Year | To Balance | 2830 | 5 | 6 | End of 3rd Year | By Profit and Loss | 1039 | 10 | " |
| | " Interest at 5% | 141 | 10 | 3 | | " Balance | 1932 | 5 | 9 |
| | | 2971 | 15 | 9 | | | 2971 | 15 | 9 |
| End of 4th Year | To Balance | 1932 | 5 | 9 | End of 4th Year | By Profit and Loss | 1039 | 10 | " |
| | " Interest at 5% | 96 | 12 | 3 | | " Balance | 989 | 8 | " |
| | | 2028 | 18 | " | | | 2028 | 18 | " |
| End of 5th Year | To Balance | 989 | 8 | " | End of 5th Year | By Profit and Loss | 1038 | 17 | 4 |
| | " Interest at 5% | 49 | 9 | 4 | | | 1038 | 17 | 4 |
| | | 1038 | 17 | 4 | | | 1038 | 17 | 4 |

be required for renewal purposes. The sums charged meanwhile will either have been utilised as working capital, or placed on deposit, or invested in securities, the interest return in the last two cases probably being small in comparison to that which would accrue from the first-mentioned course being adopted.

Recently there has been considerable discussion as to the comparative advantages of what has been termed the "straight line," as compared with the "sinking fund," method of charging depreciation. By the straight line method, if plant costs £100 and will last twenty years, £5 is the annual depreciation. The "sinking fund" method takes interest into account. For the same plant for the same period it would be necessary to pay about £3 per annum to a sinking fund if you reckon interest at 5 per cent., and since interest ought also to be paid upon the capital employed, a further £5 would be provided for interest, making together £8 per annum. As has been well pointed out by Sir William Schooling, the straight line method is only the sinking fund method with interest at 0 per cent.

It has been urged with justification that, so far as a depreciating or wasting asset is concerned, what is known as the "Annuity" system should be employed for the purpose of deciding whether it is more advantageous to expend capital in one direction than in another. The procedure adopted under this system is to set aside annually an amount which will write off the amount of capital originally sunk, plus interest thereon, during the time it remains sunk in the asset. As the amount of capital is in course of reduction each year, the interest credited to Revenue becomes less each year, but it is urged that in practice this reduction is in large measure, if not altogether, compensated for by the greater earning power of the

accumulated instalments, if used in the working capital of the business. The "Annuity" system as compared with the "Fixed Instalment" system lightens the earlier years of amortisation, but necessitates heavier charges in later years, and involves in addition a heavier average charge. In either case the residual value of the plant should be deducted from the original cost before calculating the amount to be written off each year, as the residual value should be realisable at the end of the term.

Where the life of the asset, be it leasehold or other property, is of long duration, the more economical course is, by insurance or otherwise, to invest annually such a sum as will with the aid of compound interest accumulate to the amount of the original capital expenditure at the end of the life or lease. If the investment be as by way of an insurance policy, no question would arise as to provision against fall in values of the securities in which the sinking funds were invested. That such question may be one of great importance is shown by calculations made in 1909 by the City Registrar of Glasgow, that if the corporation had invested its sinking funds year by year in Consols for the last twenty years, the loss at prices current at the time the calculation was made would have amounted to £500,000.

Messrs. Gill & Cook,* in a paper on "Principles Involved in Computing the Depreciation of Plant," pointed out that depreciation concerned the engineer, the financier, and the accountant, and that for these three there was only one common method. This, in the opinion of the writers of the paper, was best studied in the annual charge for plant based upon first cost, residual value, and the physical and economic lives of various classes of plant, by estimating the charge for return on capital and by

* Paper read before the Scottish Section of the Institution of Electrical Engineers, January 9, 1917.

placing the interest earned on reserve funds to the credit of its source. They urged the creation of two funds—a Reserve Fund for providing the necessary money at the end of the physical life of the plant, an Improvements Fund for providing sufficient additional money to enable the plant to be taken out of commission for reasons within the owner's control, and whilst it was still rendering the service originally expected of it.

The question of the liabilities of lessees for dilapidation and waste of premises calls for some consideration in reference to the matters here referred to. If, under the conditions of the lease, dilapidations require to be made good upon its expiration, provision for the necessary outlays should periodically be made, preferably through a sinking fund. A convenient summary in tabulated form of the law relating to dilapidations will be found in Mr. Fletcher's book on the subject.*

In many businesses it may be found advisable, for the purpose of estimating depreciation, to divide the objects into classes, for although the general result of the business operations during a given time may be normal, yet by dealing separately with the depreciation of each class of appurtenance it may be found that some of the departments show abnormal results. A general rate of depreciation may lead principals to neglect what, comparatively, may be more profitable operations; or to push a department of the business which, if it bore its full proportion of depreciation, would yield less than the average rate of profit.

This separation of departments is the more desirable as the same method of allocation will obviously not apply to *loose* plant and tools and to plant and tools which are fixed.

* "Dilapidations." Banister Fletcher. London: Batsford.

Although it is theoretically possible to frame a scheme which would enable the cost of the loose plant and tools to be allocated to the various working orders, generally it would in practice be found not worth while to carry it out. The cost of these tools, even in a large establishment, is comparatively small, and under ordinary circumstances the depreciation of loose plant, tools, and patterns so slight on any one working order that it simply suffices to book all these implements out to a loose tools and plant account for each shop or department. In many cases it is usual at the end of the year to allocate this account to profit and loss, and in others, to make an inventory of the tools and their value at that period, and to write off to profit and loss account through a shop expenses or similar account a proportion, often 25 to 35 per cent., of the total of the book value of the loose tools and plant in use. It is evident that, if desired, some percentage ratio could be established between this loose tools and plant account and the amount spent on wages, and thereby the cost be allocated to any given working number; or the loose plant and tools might be re-valued annually, the difference in value being carried to profit and loss, and the cost of their repair during the year charged direct to profit and loss account. In either of these cases the amount charged to profit and loss could be allocated in common with the indirect factory expenses as a percentage upon wages, as explained in the chapter on the allocation of indirect or incidental expenses. That there may be a more effective check on the cost of tools, and to aid in the prevention of their misappropriation, it is often made a shop rule that no tools to replace any worn out are issued without part or parts of the latter being returned to the stores.

Kits of, or additional, tools supplied to out-workers

being sometimes included in the stores surveys cannot arise, and thus when the loose plant is either not surveyed or incorrectly appraised, unduly increasing the profit earned.

The same methods are applicable to the patterns account, save that it may be desirable to place a heavier depreciation rate on some patterns or moulds than on others, as a provision against their becoming obsolete. Patterns made for a special order, which is not likely to be repeated, or repeated only after a considerable interval, should be taken at a merely nominal value, and the balance of the amount spent on them should be transferred to the stock order, for the execution of which the patterns were made. In the valuation of patented patterns, it must be remembered that the special value is in the patent, and not in the material of which the pattern is made. The rates of depreciation on patterns will vary very widely, and it is desirable that, as far as can be done, the patterns should be classified.

With fixed plant and machinery the case is different. Each distinctive object should be numbered, and its value, together with a description of the machine, a record of its loose parts, and the name of the supplier, be entered in a Machinery or Plant Ledger (Specimen No. 39).

All material issued for, or time spent on, any machine or implement belonging to this category, whether for running, maintenance, or renewal, should be duly recorded in the same way as the materials and wages consumed in the manufacture of stock (see Chapters II., III., IV.). The expenditure on the various machines and other objects constituting the Plant may be carried direct to the respective accounts in the Plant Ledger, in which case the total amount of wages, material, and sundry disbursements in the Commercial

Ledger would, for any given period, agree with the totals under similar heads debited to the Plant Ledger and the Cost Ledger taken together, or the expenditure may appear in the Cost Ledger to the debit of the respective Plant Working Numbers. Instead, however, of the latter accounts in the Cost Ledger being credited by a transfer to stock, as in the case of a Stock Order, they would be credited by a transfer to plant—a Plant Debit note (Specimen No. 40) being the medium. In either case the cost

PLANT DEBIT NOTE.—SPECIMEN NO. 40.

Machines at Work in _____ Shop on _____ 19 .

| No. of Machine. | Employed on Order No. | Time Working between. | To be filled in by Time Clerk or Machine Checker. | | |
|-----------------|-----------------------|-----------------------|---|---------------------|---------|
| | | | Time Working. | Rate to be Charged. | Amount. |
| | | | | | |

of, or expenditure upon, plant is carried to the debit of the various accounts in the Plant Ledger, and the process by which the amount written off in respect of use and depreciation is credited to the Plant Ledger, and debited to the Working Orders, which are to bear their proportion of the charge, is as follows. The time clerk or an assistant, or in a large establishment a machine checker, should obtain each day from the foreman of the shop an account of the time during which each machine has been working, and to what order number the work was done.

Plant return. At the end of each week, or other convenient period, a Plant Return (Specimen No. 41) should be compiled and sent to the counting-house.

The back of this form could be used for recording the

number of hours the different machines were running or were idle, and comparing the amount earned with the value of the hours lost. The rulings should show the machine number, the rate per hour, hours working, hours idle, the amount earned and amounts earnable, but not earned.

PLANT DEBIT SUMMARY.—SPECIMEN NO. 41.

Return of Machinery at Work and Charges to be made for ———
ending — 19 .

| No. of Machine. | Order No. | Order No. | Order No. | Order No. | Order No. | Order No. | Total for each Machine. |
|----------------------|-----------|-----------|-----------|-----------|-----------|-----------|-------------------------|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| Total for each Order | | | | | | | |

The life of a machine, or, in other words, the number of working hours of average effective service a machine will last, being known, the principal or some other competent person would establish a ratio between such working hours and the cost of the machine, including therein its original value, installation, maintenance, and other charges, and allowing for residual value.* In fixing the ratio or ratios, consideration is necessarily given to the fact that the depreciation of the moving parts of a machine stand in more direct relation to the number of hours worked than do the structural portions. These, however, are but some of the considerations which enter into the fixing of the rates for machinery use; the "rest" time for overhauling, and many other factors, enter

* As indicative of the greater attention now being given to the matter of effective working hours, it may be mentioned that in 1910 the charge for depreciation of machinery at the Glasgow Cotton Spinning Mills was reduced on account of shortened hours of work.

Original cost and life of object.

into a scientific make-up of the rate.* On this basis a voucher would be prepared in the office for passing through the Cost Ledger the debits to the various working orders, and the credits to machinery accounts under the various numbers of the machines; or, in place of these vouchers, it may be found convenient to enter all the details through a Plant Journal. When the machine is worn out, it should be sent into Stores with a Plant Recovered Note showing its estimated realisable value, at which amount it becomes a credit to capital. Any credit or debit balance that remains on the book value of the machine may, as thought desirable, either be carried to the profit and loss account or to a reserve fund, should one have been opened to provide against loss on plant. Should it be found that the machine is likely to have a longer life, or to give more working hours than was expected, the rate per hour may of course be diminished, so that future working orders may not be debited at a higher rate than is necessary, and equilibrium on the debit and credit sides of the Plant Ledger be produced. In some cases, instead of each machine being dealt with separately, the machinery is grouped, and the rate fixed is applied to the group. This method does not bring out the results of the working of each machine, but only of a class of machines. Whatever method is adopted, the account or accounts will be charged not only with the expenditure directly incurred on the

* The depreciation problem may be viewed from two standpoints—that of the accountant and that of the engineer. The engineer deals with physical conditions, studies plant deterioration, the necessity of replacement, and so on. The accountant devises the ways and means of recording, in the most intelligent manner, the facts in connection with the charges. The work of the two should be correlated through a common understanding of the character and extent of depreciation. “Principles of Depreciation.” Earle A. Salicis. Yale University.

machine, but with its due proportion of site or rental charges, rates, lighting and heating, in proportion to the space occupied by it. Charges also arise in connection with the supply of power, of participation in the general services of the works and the undertaking. The capital charge in connection with the purchase and installation of the machine has already been referred to, and for comparison with hand labour, the interest on such capital should also be included.

The increasing recognition of the need for the systematic treatment of depreciation is evidenced by the attention now given to the subject by accountants,* engineers,† and managers.‡

To a large extent the discussion has centred on one or two general principles, such as the adequacy of the amount written off, the rates of percentage on various classes of machinery, and whether the rates should be based on original cost or yearly diminishing values, as these two methods produce widely divergent results in the accounts year by year. The incidence of depreciation on the cost of the product has received but scant attention. It has been proposed that by means of a register of plant, separate accounts should be kept for different classes of machinery, showing the original cost, the maintenance and renewal expenditure, the yearly percentage written off original value, and the present value of each machine.§

* F. M. Burton, F.S.A.A., "Commercial Management of Engineering Works."

† "Repairs, Renewals, Deterioration, and Depreciation of Workshop Plant and Machinery." Paper read before the Institution of Mechanical Engineers, by James Edward Darbyshire.

‡ "System in Factory Costs." James Rider.

§ F. D. Leake, "The Question of Depreciation and the Measure of Expired Outlay on Productive Plant: a Plea for the Study and Use of Better Methods." Paper read before the Institute of Directors. Leake's "Register of Industrial Plant for the Measurement of Depreciation." Good & Son.

The continuously increasing use of machinery, and the larger ratio the cost of its use bears to the total cost of production, emphasises the desirability first advocated in the first edition of this book, of systematically charging machinery costs over the processes, or articles manufactured. The problem is not, as has been said, what system most fairly charges the profits of successive years, with the benefits respectively derived by these years from the use and enjoyment of the assets, but what system most fairly charges each unit of product with the proportionate cost of the machinery and plant expended on its production.

It has been suggested that the time rate for each machine should be based on the assumption that it is being worked continuously to its full capacity. Thereby the advantage, or the disadvantage, of the use of the particular machine relatively to manual labour or other machines, the effect of insufficiency of orders to keep the plant fully employed, will be more manifest, and the extent to which economies in production could be carried under other circumstances more clearly shown. As machinery is often not continuously employed to its maximum extent the adoption of this procedure would generally entail less than the actual lessened value of the machinery being written off to the various Stock or other orders during any given period. The further suggestion has therefore been made that the balance remaining on each plant account, being the difference between the amounts charged off on the before mentioned assumption, and the actual lessened value should be charged off by means of a supplementary rate to an Idle Capacity account, as representing a loss, or more correctly, a non-realised gain, consequent upon the non-utilisation of the plant to its full capacity. The information thus obtained would be of great value to the manufacturer in considering how he can, having regard to market and other conditions, realise from his plant

the maximum economic advantage. The importance of this consideration cannot be too strongly emphasised, for whilst in the case of labour the number of employees directly engaged in production can be regulated from time to time by the volume of trade, such readjustment is not possible in the case of machines whose maintenance, standing charges, and depreciation have to be provided for, whether idle or employed.

Another mode of dealing with machine rates is to fix a normal rate per hour for the use of any particular machine, and charge the stock or other order accordingly, and to adjust these results from time to time by means of an additional rate which would be based on the fluctuations of trade, and the abnormal use or otherwise of the machine. If the results of the additional rates are charged off to the Stock or other orders, without being specially noted, it would seem that so good a measure of the idle capacity of the plant would not be obtained as by the procedure before described.* It is desirable that separate rates should be fixed for the Productive Hour and the Idle Hour.

Cost of fuel. This system of charging depreciation on the basis of the life of a machine and its cost would equally apply to the apportionment of the cost of engines and boilers and of the fuel used in them. The total number of hours the machinery is running will, when the life and cost of the engines and boilers have been ascertained, enable working orders to be charged with their proportion of cost. Similarly, the aggregate number of hours the machinery is in use being known, the division of the fuel account for that period by this number will give the cost of fuel per hour for each working order.

* Interesting data on the matter is to be found in "Factory Accounting as applied to Machine Shops," Whitmore; "Proper Distribution of Expense Burden," A. Hamilton Church; "Oncost," John Mann, jun., M.A.C.A.

The continuously increasing use of electricity as a motive power, and the attachment of motors to individual machines, permits by its possible subdivisions of cost, a much greater accuracy in the allocation of power charges than is practicable in the case of steam.

When depreciation is allocated to the various processes in the carrying out of which the plant has been deteriorated, it will not, of course, appear as a separate item in the profit and loss account, but will diminish the gross profit by increasing the cost of production of the articles manufactured, instead of showing larger gross profit only to be reduced by a general charge for depreciation, as is the case when a lump sum is charged to profit and loss account in respect of such depreciation.

The explanation of the prime cost system given in Chapter IV. was not complicated by a reference to the subject of machinery use and depreciation, which, at that stage, would have been inconvenient; but no difficulty will be found in assimilating this method of charging for the use of machinery with that of recording cost of labour and stores as described in that chapter, and thus ascertaining cost of production.

It should be mentioned that there are items in the books of a private firm or joint-stock company to which no general rule of writing off is applicable. Such are the cost of good-will, patents, trade marks, copyright designs, etc.; for although, as in the case of patents, the life of the asset is clearly defined, the incidental advantages derived from the possession for a term of years of a valuable monopoly do not necessarily cease upon the expiration of the term of the patent. On the contrary, the value of the good-will may increase although the term of the patent is expiring. Whether there is a

**Effect on
profit and
loss account.**

**Prime cost
and depre-
ciation.**

**Deprecia-
tion of good-
will,
patents, etc.**

patent or not, good-will generally increases with age if profits are maintained, or are expanding. Assets such as these should be considered as having a combination value, differing altogether from their value *per se*. The obvious rule, therefore, is that in the balance-sheet such assets should appear at their cost value,* and need not be written down unless their realisable value as integral parts of a going concern falls below their cost value. It is nevertheless desirable to create gradually special reserve funds against such values as a provision against change of conditions. Any estimated increment may be accounted for by the creation of a special fund, as explained on p. 143, but until such estimated increased value is realised it should not be considered as an element of profit.

A different set of considerations apply, however, to the writing down of wasting assets.

In some cases, such as timber plantations, where the approximate value per acre of the timber is known, it is not difficult to arrive at the sum, having regard to the areas in the plantations in which the trees are felled, and the cost of felling in, and transporting from that area as compared with the other areas, which should yearly be debited to an appropriate Trading Account, and credited to the account making provision for the amortisation of the capital originally spent on the plantation.

* *The Accountant* of Dec. 6, 1913, contains an interesting article from an American correspondent in which this view is ably criticised. The writer of that article urges that Good-will should be evaluated for the Accounts and Balance-Sheet from the general results of the business from time to time. In his opinion capital is a derived value from income or profits, and Good-will in an improving business may be debited with a reasonable additional capitalisation. He adds, "Cost does not make value." There are no *tangible* assets in the sense used by accountants. Values represent human judgments: they vary as judgments vary; at best they are perhaps extremely uncertain things. If this be true, why should not the fact be frankly recognised in accounting?

In the case of mineral ownerships where the contents of the mine cannot be ascertained, or of oil springs, or brine runs where the extent of the supply is not known, a reasonable rule would seem to be to charge revenue on the quantity extracted or drawn at the rates of royalty usually charged to their lessees by owners of such properties in the district.

Although from the decisions previously quoted, it is apparently not legally necessary to make provision for these and similar wasting assets, profits cannot, from an accountancy point of view, be truly ascertained without such provision being made.

CHAPTER VIII.

STOCK.

WE are now prepared to consider the final stage of the book-keeping appertaining to the production and disposal of commodities. In the preceding chapters we **Resumé.** have endeavoured to show as comprehensively as the limits of this treatise admit, the manner in which the multifarious transactions relating to the expenditure of labour and material are recorded in the factory books, and how those books assimilate to the commercial accounts of a manufacturing business.

In the second chapter we have dealt with the employment of labour and the payment of wages ; in the third, with the purchase and consumption of materials or stores ; in the fourth, with the prime cost of the manufactured article called stock ; in the fifth, with indirect or incidental expenses and their allocation ; in the sixth, with the relation of fixed capital to cost ; and in the seventh, with the mode of charging the product with the cost of the provision and use of machinery.

In this chapter we propose to trace the records which should be made in connection with the realisation or distribution of the manufactured commodities. This branch of our subject embraces, so far as book-keeping is concerned, four distinct classes of transactions :—

Manufactured commodities.
Four classes of transactions.

- 1st. The transfer of the finished article called stock from the factory into the warehouse.
- 2nd. The return of some articles from the warehouse to the factory for the various reasons which will be mentioned.
- 3rd. The sale or distribution of stock or manufactured articles.
- 4th. The return to the warehouse of stock issued, or of stock which was originally sold, but has been rejected or returned by the purchaser.

All these transactions have to be traced into both the stock books and the commercial books, and in the case of the sale of stock, and in that of the return or rejection of the stock issued or sold (the third and fourth classes respectively), the book-keeping is complicated by the fact that each transaction has to be brought into the Commercial Ledger at two different prices. That is to say, when an article is sold it is taken out of stock at the price at which it stands in the Stock Ledger, and, in the case of an absolute sale, it is generally invoiced to the customer at a higher price. As a consequence, a sale will appear in the Commercial Ledger to the debit of a customer, and to the credit of trading account, at the invoice price; whilst by a corresponding but independent process of book-keeping, the same transaction will appear at a lower or the cost price to the credit of stock account, and to the debit of trading account. The converse will be the case when stock is taken back from a customer and sent into the warehouse, the price at which it is credited to a customer's account not generally being the same as that at which it is debited to stock. In this way the stock account in the Ledger shows the aggregate cost value of the stock-in-trade; the personal accounts,

**Two prices
for same
article.**

Stock Books.

the amount received, or to be received, by the firm in respect of the goods sold ; while the trading account (which is debited with the items representing the value of goods issued from stock, and credited with the sales debited to personal accounts) will bring out the difference between the cost price and the selling price, which will be carried to profit and loss account, as the gross profit or loss. This process is effected by entering the sales in two separate books corresponding to each other, the one dealing with the invoice prices, the other with the cost prices, and likewise by entering the stock returned to warehouse in two books which perform similar functions for the cancelled sales. The two books in the first of these cases would be respectively the customary Sales Day Book, often called Invoices Outward, containing records of the invoices rendered, and the Sales Analysis Book, containing records of the stock requisition forms (Specimen No. 47) for stock issued. In the case of the return of stock the two books would be respectively the Sales Cancelled Book, containing records of the credit notes sent to customers, and the Stock Returned by Customers Analysis Book, containing records of the Stock Returned Debit Notes (Specimen No. 48). The advantage of carrying out the suggestions made in the introductory chapter as to distinguishing books by their bindings will be manifest in the case of these four books. The Stock Issued Book and the Stock Returned Book are kept by the warehouseman, whilst the corresponding books, viz., the Sale Analysis Book, and the Sales Cancelled Analysis Book, are kept in the counting-house.

In giving titles to some of these books we do so primarily with the desire to indicate their functions, and, as already stated, the forms suggested must be taken to mark the transactions which it is necessary to

**Titles of
books.**

register rather than the outlines of records universally applicable.

The four counting-house books are posted to the Ledger ; the Day Book individually to the debit of personal accounts, and collectively, by means of the Journal, to the credit of trading account ; the Sales or Stock Issued Analysis Book to the credit of stock account and to the debit of trading account ; the Sales Cancelled Book, the converse of the Day Book, individually to the credit of personal accounts, and collectively to the debit of trading account ; and the Sales Cancelled or Stock Returned Analysis Book, being the converse of the Sales Analysis Book, to the debit of stock account and to the credit of trading account. (See Diagram IV.).

We can now proceed to a detailed examination of the book-keeping relating to this branch of our subject.

The first class of transactions is, as before stated, the transfer of the finished article from the factory to the warehouse. The form by means of which this transfer is effected has already been referred to as the Stock Debit Note (Specimen No. 35).

This debit note is entered by the warehouseman in the Stock Received Book (Specimen No. 36), and posted to the debit of the Stock Ledger.

Upon reaching the counting-house the Stock Debit Note is entered to the credit of the Cost Ledger, as explained in the preceding chapter, and the total debits to stock, in respect of articles finished, are journalised month by month to the debit of stock account in the Commercial Ledger

With regard to the return of articles from the warehouse to the factory, which constitutes the second class of entries, it may be remarked that although the articles made for stock may all have been manufactured under the personal supervision of those who will more or less be connected with their sale, and questions as to the rejection of goods are not likely to be nearly as numerous as if the articles had been made by an outside contractor, still the question of the return to the factory of finished articles may arise either on account of bad workmanship or alteration of design, and must be provided for in the book-keeping. In all such cases it will be desirable to send into the store, at the time the finished article is refused as stock, a Transfer Note (warehouse debit to store).

Second class of transactions: Warehouse to factory.

Rejected Stock.

In Specimen No. 42 this Transfer Note is shown with a counterfoil ; but a duplicate, by means of carbonised paper, can be substituted.

The articles rejected as stock having been sent into store, it remains to be determined what alterations, if any, are to be made. Should further labour or material be required to be expended, a new stock order will be issued, and the recording of the expenditure will follow the routine laid down for the manufacture of commodities.

The adjustments as between warehouse and store are best recorded by the warehouseman and storekeeper entering the transfer notes in a Transfer Book.

Transfer Books and Notes.

The warehouseman will, of course, enter on the credit side of his Transfer Book the credits to his stock for the finished articles forwarded by him to the store. On the debit side of his Transfer Book he will enter the debit notes received by him from the

storekeeper for articles transferred from store to warehouse. The latter class of entries arise out of transactions of a **Retail trans-** retail character, not always carried on in con-
actions. nection with a manufacturing concern ; but the concluding part of this chapter will be devoted to its consideration.

With regard to the Transfer Books, the entries made by the storekeeper will, naturally, be the converse of those made by the warehouseman, and the store will be credited with all articles forwarded to, and debited with all articles received from, the warehouse. The two Transfer Books will therefore always balance. It will be necessary to post the items in the Transfer Books to the Stores and Stock Ledgers respectively, so as to bring out the correct balances, not only as between these Factory Ledgers in the aggregate, but also as between the individual Stores and Stock Ledger accounts.

The specimen ruling of the Store Transfer Book (No. 43) will, with necessary alteration of headings, apply equally to the Warehouse Transfer Book of which it is the counterpart.

Whilst we think it necessary to state in full detail the principles to be remembered in dealing with these transfers, it must in any individual case be left to the accountant to determine whether the circumstances of any particular business admit of the functions of the two Transfer Books being adequately performed by one book.

The transfer notes between store and warehouse, and *vice versâ*, can, if the nature and extent of the transactions warrant it, when forwarded to the counting-house, be entered in a Transfer Analysis Book, and the Journal entry for the commercial books be based on the amounts so arrived at ; or, if the transactions are few they can be recorded from the Transfer Notes into the Journal direct.

is found to be in proper form with regard to price, terms of payment, drawings or specification, date of delivery, penalties (if any) as to time of completion, cost of carriage, and mode of delivery, will probably initial it by way of authorising its execution. Should the stock of the commodities ordered be exhausted, or should the articles require to be specially manufactured, an order to manufacture the given or a larger number of similar articles for stock, should be passed concurrently with the acceptance of the order as already explained.

The customer's order having been accepted may be registered in an Orders Received Book (Specimen No. 44).

Orders Received Book. The order may then be passed on for execution to the warehouseman, who should have received a standing instruction to return all orders to the counting-house when completed. If it be thought unadvisable to pass the original order (which may contain references to the terms of payment, commission, or discount, etc.) to the warehouseman, he may be provided with a copy or with extracts from the Orders Received Book, or a special form of advice may be sent to him. The advice may take the form shown in Specimen No. 45.

The form could also be made to serve the warehouseman as a Stock Requisition, and it would, in that case, be entered in the Stock Issued Book. In cases in which the goods are ready for shipment, and further instructions have to be given concerning them, the form would be sent to the counting-house, and if the dispatch of the goods be approved, the requisition could be returned to the warehouseman with the information inserted thereon. It is necessary to follow this routine if, as is sometimes the case, it is not possible for the customer

to give complete instructions as to forwarding when placing the order, or if special arrangements as to payment before, or on, delivery have to be made.

In some cases it is desirable to supplement the Stock Requisition by a "Forwarding Note," issued on the request of the warehouseman. This note not only gives the warehouseman the final instructions as to shipment, but also attaches to the signatory the responsibility for seeing that the final tests or examinations of the apparatus have been made.

STOCK ISSUED BOOK.—SPECIMEN No. 46.

| Date. | Sale Order No. | Article. | No. | Weight. | | | Price. | Amount. | Ledger Fol. |
|-------|----------------|----------|-----|---------|------|------|--------|---------|-------------|
| | | | | Cwts. | Qrs. | Lbs. | | | |
| | | | | | | | | | |

Should the original order be sent to the warehouseman the stock may be drawn from the warehouse, according to the conditions of the business, either by **Stock Requisitions.** posting the order direct to a Stock Issued Book (Specimen No. 46), or by means of a Requisition Form (Specimen No. 47).

The requisition would likewise require posting in the Stock Issued Book. In this case that book would require, for purposes of reference, an additional column for the No. of the Stock Requisition. The Stock Issued Book will of course in turn be posted to the credit side of the Stock Ledger.

Where there is great variety in the articles sold, or multiplicity of transactions, it may be desirable that the counting-house should be kept regularly informed of the stock issued each day. This can be done either by alternate Stock Issued Books being kept, so that the previous day's record of stock issued may be always at the counting-house and the current day's record in the warehouse ; or the warehouseman may send in every morning a Stock Sent Away Form, showing all stock that has been issued during the previous day, giving in each case the Order No., so that the clerk invoicing may immediately turn to the Orders Received Book and see the stipulations and conditions on which the order was accepted.

It is also desirable that the amount of the stock requisitions should, in the counting-house, be entered and analysed in a Stock Issued or Sales Analysis or Sales Analysis Book. This book (of which we do not give a specimen ruling, as it pertains to the counting-house) should be so ruled that the various items entered from the Stock Requisitions may be analysed under the various branches of the business. The aggregates of the totals of such branches would necessarily agree for any given period with the totals of the stock requisitions for the same period, and necessarily also with the totals of the warehouseman's Stock Issued Book.

The fourth class of transactions referred to at the outset of this chapter involves the procedure to be adopted in the factory with regard to stock which is rejected or returned, after having been sent out for inspection or approval, on loan, hire, or exhibition.

Fourth class of transactions: Stock back to warehouse.

Daily return of stock issued.

Stock Issued or Sales Analysis Book.

No. _____
 STOCK REQUISITION FORM.—SPECIMEN No. 47.
 Entered in Stock Issued Book, Fol. _____
 Requested from Warehouse _____ 19 . Requested and Received from Warehouse _____ 19 .

| Article. | Sale Order No. | No. | Weight. | | | Article. | No. of Sale Order. | No. | Weight. | | | Price. | Amount. | Stock Issued Book Fol. |
|----------|----------------|-----|---------|------|------|----------|--------------------|-----|---------|------|------|--------|---------|------------------------|
| | | | Cwts. | Qrs. | Lbs. | | | | Cwts. | Qrs. | Lbs. | | | |
| | | | | | | | | | | | | | | |

Requested by _____ Received by _____

No. _____
 STOCK RETURNED DEBIT NOTE.—SPECIMEN No. 48.
 Stock returned to Warehouse _____ 19 . Stock returned to Warehouse _____ 19 .

| Article. | Sale Order No. | No. | Weight. | | | Amount. | Article. | Sale Order No. | No. | Weight. | | | Price. | Amount. | Fol. |
|----------|----------------|-----|---------|------|------|---------|----------|----------------|-----|---------|------|------|--------|---------|------|
| | | | Cwts. | Qrs. | Lbs. | | | | | Cwts. | Qrs. | Lbs. | | | |
| | | | | | | | | | | | | | | | |

Returned by _____ Received by _____

Stock Returned Debit Note. The warehouseman on receipt of such goods will make out a Stock Returned Debit Note (Specimen No. 48).

Stock Returned by Customers Book. These Stock Debit Notes will be duly entered in a Stock Returned by Customers Book (Specimen No. 49), which will be posted to the debit side of the Stock Ledger.

STOCK RETURNED BY CUSTOMERS BOOK.—SPECIMEN No. 49.

| Stock Debit Note. | Article. | Sale Order No. | No. | Weight. | | | Price. | Amount. | Stock Ledger Fol. |
|-------------------|----------|----------------|-----|---------|-----|------|--------|---------|-------------------|
| | | | | Cwts. | Qrs | Lbs. | | | |
| | | | | | | | | | |

In the office the Stock Returned Debit Notes are entered and analysed in a Stock Returned by Customers Analysis Book, which is the converse of the Sales Analysis Book already referred to. As an instance of the possibility of concentrating the books while adhering to the principle laid down, it is well to mention that in an establishment where there is little variety in the articles sold, or where the sales are not numerous, the Stock Requisition might form the basis on which goods are invoiced from the office. In such cases the Sales, or Day Book (debit to customers), should be provided with a column in which the stock price of the article as shown on the requisitions could be entered against the respective invoices. It would thus be possible by the mere process of addition to ascertain the total amount of the invoices

Stock Returned Analysis Book.

Concentration of Books.

rendered, and the value at stock prices of the articles so invoiced, thus obviating the need for a Stock Issued (or Sales) Analysis Book.

Equally the Stock Returned Debit Note for goods returned by customers might be treated as the basis for the credit note to the customer, and the Sales Cancelled Book (credit to customers) might be so ruled as to show the invoicing, as well as the cost rates of the stock invoiced and returned, thus obviating the need for a Stock Returned Analysis Book. This concentration of books does not prevent an analysis being made under departmental or other heads, either of the invoices or credit notes, or of the corresponding stock requisition or stock debit notes. The issuing of credit notes for allowances made by the principals either on account of defects in the articles supplied, or for other reasons, is not dealt with in detail, such issue and record being usually a matter of office routine.

In the case of articles sent out for inspection, on approval, consignment, sale or return, or loan, it is very desirable that while a *pro forma* invoice, at the normal selling price, should accompany them, the articles should, until an order is received or a definite sale effected, be dealt with in the Sales or Day Book at their stock prices as the invoicing rates. We cannot too strongly insist on the great disadvantage of treating loaned goods in any other way. The system of showing book profit on these transactions is most fallacious, and so misleading that it cannot be resorted to extensively, or for any length of time, without causing serious embarrassment. It is evident that the stock loaned is not likely to be always uniform in character, quantity, or value, and that if treated in precisely the same way as goods sold the profit and

**Goods on
loan.**

loss account for any period is unduly increased at the expense of other periods. In addition, the profits are not realisable until the sale is made. Articles sent to branch establishments necessarily follow this rule also. At each balancing period, therefore, the Returns Book should be specially examined to see that allowances for all returns are properly brought into account. In some cases these transactions are ultimately recorded in special books, known as "On Approval" or "Consignment" Ledgers.

It will be manifest that the entries in the Stock Ledgers consist of debits for stock received from the factory and for **Recapitulation.** stock returned from customers, and of credits for stock sold to customers and stock transferred to store and that the balances under the various headings will show the number and the value of the various articles on hand, and the aggregate of such balances the total value of the stock, which should of course agree with the total value shown by the Commercial Ledger, and with the results of the surveys.

It will also be obvious that, as regards the office, the various items in the Day Book and the Sales Cancelled Book being posted to the debit and credit of the various purchasers respectively, the sum of such items will in the case of the Day Book give the total credit to trading account for invoices rendered, and in the case of the Sales Cancelled Book the debit to trading account for stock returned by customers.

The total of the Sales Analysis Book gives the amount which through the Journal is debited to trading account and credited to stock, and the total of the Stock Returned by Customers Analysis Book gives the amount which through the Journal is debited to stock and credited to trading account.

When these entries have been made the trading account will show with absolute exactness the gross profit realised, and the balance of the stock account (after journalising the debits to stores and credits to stock on account of transfers) will be the value of the stock ready for sale. The relation of these various transactions one to another will be made manifest by Diagrams IV. and V. In practice an account in the Stores Ledger may be the record of an article or a group or articles, as may be found the more convenient for the purposes of the business, and the methods, as previously described, of economising detail in the Stores Ledger are equally applicable in the case of the Stock Ledger.

In an earlier part of this chapter we alluded to the possible combination of a manufacturer not only distributing the commodities he manufactured, but also, in exceptional cases, acting as a retailer of goods produced by others.

It must not be overlooked that there is a fundamental distinction in these transactions. If a manufacturer acts to any extent as a retailer, it will be well to draw a clear line of demarcation between his two branches of business. In the retail branch, which is an ordinary buying and selling, and not a manufacturing, business, the book-keeping is such as properly pertains to the general office. In an extensive business where this combination obtains, it may be desirable to establish a separate retail warehouse as distinguished from the warehouse which is the repository of the manufactured stock.

If, however, the retail transactions are exceptional, and their volume does not warrant in practice any absolute division from the manufacturing portion of the business, the articles which are bought merely for resale, and on

**Further
notes on
retail trans-
actions.**

**Retail
warehouse.**

which neither time nor material are expended in the factory, can be dealt with either as stores, or preferably, as stock.

If they are dealt with as stores, the procedure followed is that described in Chapter III. for the receipt and withdrawal of material, save that the store warrants **Store method.** for articles withdrawn for sale, when they reach the general office, should be entered in a Stores Sold Analysis Book, the items in that book being posted to the debit of a stores sold, retail trading, or other similar account in the Commercial Ledger, the credit to that account being the total of the invoices rendered to customers for goods retailed, and the balance representing the gross profit or loss on that branch of the business.

If articles for retailing be treated as stock, the invoices from the vendors can be passed to the warehouseman, the procedure being similar to that for invoices **Stock method.** for stores purchased, which is fully described in Chapter III. In this case the invoices would be debited in the general office to stock account; and the withdrawal of the articles from the warehouse would entail a credit to the same account, and a debit to a retail trading account; this latter account being credited with the value of the invoices rendered to customers. So far as the factory is concerned, the invoice for goods purchased would pass through the Stock Received Book (Specimen No. 36) into the Stock Ledger, and the Stock Requisition (Specimen No. 47) would pass into the same ledger through the Stock Issued Book (Specimen No. 46).

An equally effective and probably more simple method would be to pass all such exceptional items from store into stock by means of the Transfer Book (Specimen No. 43). By these means all invoices for goods purchased would pass through the commercial books to the debit of one account,

namely, that of stores, and conversely all invoices for goods sold would pass through the same books to the credit of the trading account, the debit to this account arising from the stock value of the goods.

We have already referred to the desirability of localising the cost of articles, and shown that the cost of parts of articles can be ascertained by following the routine described, but in concluding this chapter it will be well to refer briefly to those cases in which parts complete in themselves but subsidiary to the manufacture of other articles, are produced in greater quantity than is required for the manufacture of the articles of which they form part. This increased production may be due to certain parts being of a more permanent type than others and added to stock with less risk of obsolescence, to their greater production at one time cheapening the cost, to their being parts which may be required for renewals or repairs, to there being a dearth of work in any particular branch of the factory, or to other special causes.

Whatever be the reason for their production, all expenditure on them should be recorded as in the case of a manufacturing or stock order, and the routine described in the chapter on stores should be followed. As the parts made in excess of the number required for the manufacture of the finished article will all have been charged to stock by means of the Stock Debit Note, those intended for sale will remain in the warehouse and be duly recorded in the Stock Books, while those parts intended for future use in manufacture will require to be transferred to the store by means of the Transfer Books, and will be drawn out of store by means of Stores Warrants like all other material required for manufacture.

Diagram V. gives a view of the books and forms referred to in this chapter, and their relation to each other.

CHAPTER IX.

SURVEYS.

THE most obvious utility of the Stores and Stock Ledgers, kept in the manner described in the preceding chapters, is

**Utility of
Store and
Stock
Ledgers.**

that by their means the store-keeper, warehouseman, and others concerned, are able to ascertain what is the quantity of any particular commodity

on hand at any given time, without the delay and expense involved in the process generally known as "taking stock."

The ability to obtain this information in an accurate and speedy manner has a very wide and important bearing upon the general accounts of the firm. Unless it is at command it is impossible, in undertakings of any magnitude, to determine, even approximately, until a survey has been made, what is the result of the business. It is claimed for the

system of accounts we have explained in these pages, that one of its chief advantages lies in the fact that it obviates the necessity of taking stock simply for the purpose of drawing

**Stock-
taking for
Balance-
sheet.**

up a balance-sheet. The economic value of this advantage to principals whose business is liable to many vicissitudes, can scarcely be overrated, for

it removes one of the most powerful obstacles to the frequent closing of the books and ascertainment of the results of the business. There is no doubt that balance-sheets would be

made up much more frequently than is usually the case, if it were not for a survey being a very troublesome and expensive matter, and that proprietors would be kept more fully *au courant* with the tendency of their business than can be the case when the books are closed only at long intervals of time. Under the methods of book-keeping here advocated, a survey would simply serve the purpose of substantiating the results deduced from the books of account, and it is this feature which, perhaps more than any other, distinguishes a proper system of Factory Accounts from the methods generally adopted. **Many Factory Accounts mere memoranda.** Factory books, when kept, are often for the most part of the nature of memoranda, being simply methods of book-keeping by single entry, and lacking both coherence and continuity, inasmuch as they are merely disconnected entries, which can be verified and assimilated only by means of the periodical surveys.*

Unless Stores and Stock Ledgers are kept in some such way as described, it is imperative that the survey of all articles, if it is to answer any useful purpose, should be made at one time, for, in the absence of factory books, the only comparison of which the result of the survey admits is with the totals of the stores and stock accounts of the Commercial Ledger; but even this comparison can be one of book values only, and not of quantities or measurements, and an effective verification of the details of the survey is altogether out of the question.

* "Cost accounts which do not at any time come into agreement with the Commercial Accounts, and are not subject to those continuous checks which safeguard the accuracy of the Commercial Accounts, cannot at their best be much more than cost memoranda, with more or less uncertainty as to the results obtained, according to the conditions under which they are operated."—"Manufacturing Cost." Paper read before the Ontario Institute of Chartered Accountants, May 15, 1905, by W. H. P. Anderson, C.A.

If the survey is simultaneous it is necessary either to suspend for the time the issue and receipt of materials, or to make subsequent additions and subtractions in respect of materials received or issued during the period of stock-taking. Disorganisation generally ensues during this period, and to such an extent is this the case that it is often found necessary and convenient to suspend business while the process is going on. While pointing out the inconveniences attending periodical and simultaneous surveys of all properties, we do not wish to detract from their importance upon special occasions, when for some reason the verification of the balances of the Stores and Stock Ledgers may be required.

The existence of the Stock and Stores Ledgers enables surveys to be taken by degrees, and at times when the state of business is such as to minimise the disorganisation and attendant loss of profit. Precautions would have to be taken in cases in which a simultaneous stock taking or survey never took place, that stores or stock were not transferred from one place or department to another so as to do duty in more than one capacity. There is reason to believe that store-keepers and warehousemen would be more vigilant if they knew that, instead of a periodical survey, an inventory of any of their stores or stock might be called for at any time and without warning, and that they would be required to explain any differences between the Survey and the Ledger accounts. A further advantage of the Stores and Stock Ledgers is, that by their means any excess or deficiency of commodities shown by the surveys can be localised and easily traced.

It is to be regretted that there does not seem to be in practice any absolute standard of efficiency in regard to

stock-taking, and that the term is often applied to a superficial review of the articles, and to an estimate of what is, or, worse still, to a guess at what should be, the value. In an efficient survey every record should be based on "handling," and nothing should be estimated or taken for granted, while the pricing of the articles should be based on principles which will be hereafter referred to. In the case of large bulk stocks such as coal, pig-iron, ore, and similar supplies, if their weight is not ascertained by measurement it is often a considerable time before the stocks are sufficiently reduced to enable an inventory to be taken by means of lifting and weighing, but if a small extra percentage is added to the consumption to save waste, the survey generally verifies the book figures. In the case of stocks in which moisture is inherent, and for which varying allowances have to be made according to the different stages of drying, and the season of the year, the condition of the stock at the time the survey is made has to be noted and allowed for.

The work of a survey can in practice often be organised best by one person well acquainted with the goods calling out their description and quantity to another who enters them on the survey sheets. The pricing of the sheets being undertaken by a third who obtains his data from the tabs, or card or other tickets on the bins, racks, or other store receptacles, or from other sources, the calculations and costs and the checkings thereof being done by the accountancy staff. In practice the bin cards are very serviceable in preventing overstocking or running out of stock. The stocks should be taken on sheets or pages numbered consecutively for each class of stock, with corresponding adhesive labels for attachment to the articles or the receptacles containing them. To minimise discrepancies, it is desirable that when a general survey

is being made, suppliers of goods should be notified thereof, and asked to send special statements of account for all goods received by the purchasers prior to the date of stock-taking, for which payment had not been made. Goods which are held on the basis of agency or consignment should be separately scheduled, and the survey results compared with the special accounts in the Ledgers recording these transactions.

The results of the survey should be epitomised on survey sheets, of which Specimen No. 50 shows a ruling that will be applicable to most trades. These sheets should be so arranged as to admit of comparison with the corresponding accounts in the Ledgers.

If the system suggested in these pages be adopted, the result of the surveys would show an agreement between the number and weights or measurements of the articles according to the inventories and those standing as balances in the Ledger, and also between the aggregate money value of the articles and the balances of the respective accounts in the Commercial Ledger. It is desirable that the Ledger Balance and the Survey Sheets totals should be tabulated for comparison in detail, so that excess or deficiency in any particular item may be noted, and any undue discrepancy in excess of the margin of error in waste or weight be inquired into. Where this has not been corrected by scale adjustment or individual weighings, a comparative statement of excess and deficiency under various headings is often useful as revealing any defects in ledger-posting classification. According to the system just described the surveys would theoretically be divided between three main departments. The storekeeper would be responsible for the store of raw and old material and such articles, other than manufactured commodities and

**Agreement
of survey
results.**

Stores.

plant, as may for the time be in his charge. The next division would be that of the warehouseman, who would have the custody of the stock of manufactured goods; and the third division would only exist where the system of registration of plant described

Stock.

STOCK SURVEY SHEET.—SPECIMEN No. 50.

Stock _____ at _____ on _____

| Description | Supplied by | No. | Weight. | | | Rate. | Value. | Remarks. |
|-------------|-------------|-----|---------|------|------|-------|--------|----------|
| | | | Cwts. | Qrs. | Lbs. | | | |
| | | | | | | | | |

in the chapter on Fixed Capital had been adopted, and would comprise all fixed and loose plant and tools. As **Plant.** has already been pointed out, however, there is no objection in principle to the two departments of Stores and Stock being amalgamated, so far as the situation and custody of the same are concerned, provided the important distinction in the book-keeping explained in previous chapters is preserved. When this is done there will be no necessity to draw any fundamental distinction between these two departments for the purpose of surveys beyond such mechanical divisions as may suggest themselves in particular cases with the view of facilitating the preparation of the inventory. If that method is properly carried out, it will be found to be purely a matter of convenience in any business what divisions are made in the arrangement and disposition of the various articles. In the same way as the books,

when properly kept, will bring out the correct quantity and value of the plant wherever the machines and tools constituting the plant may be located, so they will also show the value of the stores and stock, no matter where these may be distributed. It is quite evident, however, that the quantity of stores and stocks on hand may be of such magnitude as to render the division of responsibility a matter of absolute necessity. It will then probably be found advisable, in addition to carrying out the three main divisions before suggested, to give distinctive names, numbers, or letters, to the different subdivisions of the stores and warehouses, and to identify those distinguishing signs with the headings of the corresponding accounts in the Ledgers. Each floor, room, or section could be under the charge of one man, who should be responsible for the accuracy of the records of the articles in that place, and should have a place for everything, and have everything in its place. He will be much assisted in his work if the store or warehouse is fitted with such bins, racks, shelves or other receptacles as are most suitable for the materials or articles dealt in, and by those of the same species being stored near to each other. Each of these species may also be advantageously referred to by numbers, and the sizes or other variations therein, either by letters conjoined with the numerals, or by further numerals used as a denominator. A Store or (as the case might be) a Stock Register, would thus permit of the identification of each article by name and numbers, and also record their location in the building, the general lay-out of which should be recorded on a plan. The custodian saves himself trouble, and avoids confusion, by placing on all large articles, and on the lockers or partitions containing the smaller ones, labels, or tags, describing the articles, and giving in the

**Mechanical
divisions
and aids.**

case of raw materials the name of the supplier, and in the case of manufactured articles the number of the stock or manufacturing order, the date of receipt, and, if thought advisable, the price of the article marked either in ciphers or in plain figures. The utility of indicating the price is not confined to surveys, but enables the issuer of material or stock to immediately mark on the Stores Warrant or Stock Requisition the price of the article he has issued without referring to the Ledger. The labels or "tags" are often so ruled or arranged as to permit of the recording thereon of all the receipts and issues of the goods stored in the particular receptacle. Lockers or similar receptacles should be marked with their own weight so as to permit, if thought desirable, of the contents and receptacles being weighed in one operation. Barrows and other similar appliances should also have their tare weight painted on them. The stores building should be located conveniently to a railway siding, a wharf, or a road. The stores of the different articles should be located as near as is conveniently possible to the shops in which the articles are mostly used. In the location of the articles in the stores, regard should be had to ease in lifting and to the number of times they are likely to be called for, so as to reduce labour in handling to a minimum. The essence of the satisfactory working of a stores or stock system is that articles should not be issued without the issuer receiving a formal requisition for them from some authorised person. The articles he has in charge should be to the storekeeper or warehouseman what cash is to a cashier. No one expects a cashier to part with money save as against a cheque or receipt, and no one, not even the principal, should expect a warehouseman or storekeeper to part with goods save as against a written requisition or receipt. In some cases

**Essential of
stores and
stock
system.**

in which loose tools are kept as part of the stores or stock, and issued to employees temporarily for a special use, a suitably stamped token is accepted from the employee as the equivalent of the tool, and the token is placed in the space left vacant by the issue of the tool. Should either the storekeeper or warehouseman feel that he has not a sufficient control over articles in his charge, owing to their not being in the magazine or warehouse, or for any other reason, the articles may be chained, padlocked, sealed, or otherwise distinguished in such a manner as to show that they are still either "stores" or "stock." In this connection it may be well to point out that in establishments where large numbers of workpeople and others pass through the gate, the watchman or gatekeeper should have instructions not to allow any raw material or manufactured goods to be taken outside the factory either by employees, or in carts or other vehicles, without the necessary permit from the storekeeper or warehouseman. These permits, or passes out, should be entered by the warehouseman or gatekeeper in a Gate Book which should be periodically examined and checked in the office. The Gate Book should also contain records of goods, whether received from vendors, or returned by customers which have passed the gate, which should be the sole means of exit, and which should lock from the inside only. The watchman or gatekeeper should also be instructed to look at the contents of carriers' carts when leaving the works, after delivering goods, so that material may not be improperly taken out of the works by these means. In some cases the vehicle and its contents should be weighed at the gate, the net weight obtained and compared with the dispatch note or permit.

An incidental advantage of keeping stores and stock on the system described is that it permits of a Stores

Price Book and Index being kept with comparatively little additional clerical work. The Price Book is a valuable record of prices, whilst the Index locates the position in the store of various kinds of material.

Although the distinction between Stores and Stock is fundamental, and is not likely to be lost sight of by the reader, it is well to point out the desirability of the store-keeper having a general knowledge of the nature and quantity of stock in the warehouse, and of the warehouseman being equally well informed of what material is in store. When parts of an article are both used in manufacture and sold, there will be a supply both in the warehouse and in the store, and any sudden or abnormal demand on either of the departments can be met by the

Excess one department transferring its surplus to the
Supply. other, in order to meet the emergency. An idle or excessive supply is not wanted in either branch, and although the articles common to both are not likely to be numerous, the rise or growth of such excess could be easily checked by the warehouseman being supplied at intervals with a schedule of the articles in store, which could, if necessity arose, be transferred to him as stock, and by the storekeeper being provided with similar information as to the stock. It is evident also that an equally efficacious check could be applied in the general office, where both the stock and store of any article would be known, and whence no order to manufacture would proceed until it was shown that the number on hand was not sufficient to meet the demand. A list of parts should be prepared under a symbolic notation, and used uniformly in office, stores, and shops.

The principles which determine the question of how materials and manufactured articles are to be priced at a survey admit of much discussion, but we cannot here do

more than indicate the general axioms which should be observed in a valuation of Stores and Stock. It is obviously unsound to base a valuation one year upon the cost of production of an article, and another year upon its estimated or even ascertained market value; but, nevertheless, it is to be feared that this is not infrequently done. The course adopted by probably most manufacturing firms is to value the stores at the net cost or invoicing price to them, work in progress at the amount spent upon it up to the process which it has reached,* and the manufactured articles on hand at their cost, without any addition for profit, or for standing charges as distinguished from factory charges. Recently (April 1917) the Federal Reserve Board of Washington has issued proposals for "Uniform Accounting." In the section dealing with "Inventories," most of the recommendations contained in this chapter are to be found. Par. 27, the final paragraph, states: "It may be well to reiterate that interest, selling expenses, and administrative expenses form no part of the cost of production, and therefore should not be included in the inventory in any shape." In some cases in which varying quantities of raw material of the same description are obtained from various suppliers, and are used for a number of production or stock orders, it is usual, in order to save clerical labour, to charge the issues out on the basis of a monthly average price, obtained by taking the quantity on hand at the beginning of the month and at its value, adding thereto the purchases for the month and their values, and taking the average price thus obtained as the price for all issues during the month. The greater accuracy that would arise from charging out each issue at its actual cost is said not

* See last paragraph in Chapter IV.

to be worth the value of the clerical labour involved, and that in fact the variation is but slight. Such variation would naturally be greater if the average cost for the preceding twelvemonths were taken, as was suggested by Mr. Elbourne and Mr. Maughfling in "Approximation in Factory Accounting." In the case of material or articles, such as wine or timber, laid down for seasoning or maturing purposes, the invoicing price is sometimes increased *pro rata* to the amount which may have been charged to the account in the Commercial Books as representing interest on the capital expended in the purchase of material not ready for use. The same procedure, but only up to the limits of normal or average price, is probably justifiable when, owing to some special circumstances, such as a forced realisation, or sale by auction, stores or material have been purchased at less than cost price. Profit which may eventually arise from the use or sale of specially low purchases should not be anticipated, but it would not seem unreasonable to charge interest on the dormant capital, but subject to the limits already referred to. In some metal trades the method of pricing stocks is based on different principles to those adopted in the case of manufactured articles. Thus with copper, lead, spelter, some of the stock is taken at basic value on the theory that it is necessary for the owners to hold a reserve stock to protect themselves against strikes and adverse fluctuations in market value. The price represents a minimum cost over a series of years for a minimum quantity which is presumed to be kept untouched. It is held by some, however, that as in most trades the actual stock-in-trade is used within a comparatively short time, and that as the stock lowers in price, so also do the corresponding sales, that no hardship arises in normal times from applying the usual rules. Rules which may be

equitable under conditions and circumstances coincident with the Excess Profits Duty are not necessarily applicable under other conditions.

In some instances advantage may arise from the cost of the Stores Department being met by a percentage commission being charged on the value of the Stores issued, and it has been suggested that this loading percentage should equal the discount at which supplies are bought, so that the Stores Department would thus automatically make a profit or loss, equal to the amount by which its expenses were less or greater than the aggregate discounts it obtained. This method, however, may lead to departmental friction, and in some cases, especially where large trade discounts are allowed, would tend to

vitiate the actuality of cost records. The practice of including in the valuation of Stock a percentage for establishment expenses, or standing charges, is one which cannot be too strongly condemned, if on no other ground than that a business which is really the reverse of profitable might, by the simple device of manufacturing and accumulating a large stock, be made to appear for a time as at any rate self-supporting. That is to say, a business might be made to appear flourishing, while as a matter of fact it was becoming less solvent, by reason of its cash and other available assets being converted into manufactured stock which may never be realisable, and by the standing charges (if these are included), which in the absence of *bonâ fide* business transactions would represent losses, being made to figure in the balance-sheet as good assets in the

shape of stock on hand. The right principle undoubtedly is that in a manufacturing business a profit should not be considered to have been made until a sale has been effected, or until a contract for the delivery

Book values should not include establishment charges.

Profits are latent.

at a future date of goods already manufactured has been entered into.* In cases in which raw material is purchased for use, it should be taken into stock at cost.† In the case of the production of raw materials and in those exceptional cases in which the stock of manufactured articles could be put upon the market and realised at their normal price, a modification of this principle may sometimes be necessary; as in cases where the product is generally saleable at an ascertained market price (or, at any rate, at an approximation to it), and it does not seem incorrect to say that the profit which that price leaves has been earned on the production of the commodity and not on its sale. Nevertheless, even in this case, it would probably in the long run prove to be more judicious to price the commodity in the books at its cost, and only to credit profit and loss account with the profit when sales have been effected. In the exceptional case of the market price being lower than cost,

* "Profits can only be made out of the sale or exchange of one commodity for another of a definite and realisable cash value. The price increase in the market value of an article which it is not intended to sell at that time, cannot be considered as a profit, for the reason that the article may never be sold at that price, and the paper profit may never be realised. . . . In a quite recent case, the directors of a corporation have been held personally liable for a sum of \$1,000,000 in respect of dividends distributed to stockholders out of fictitious profits created in just this way."—A. L. Dickinson, M.A., F.C.A., C.P.A., "Some Special Points in Corporation Accounting."

In the opinion given by the Committee of Consulting Accountants advising the Ministry of Munitions in 1917, the opinion is expressed "that all stocks of every sort and kind should be valued on the basis of cost price or market value, whichever is the lower." This principle rests upon the theory (which is perfectly sound) that profits can only be realised by the sale of commodities, and that no profit can arise by mere increase of value unaccompanied by a sale.

† Thus in the case of a brewery, "Hops should be taken into stock at cost, for supposing . . . the price fell, this would mean not that the brewery has made a loss, but that if they had waited and purchased at present prices they would have made a larger profit out of next year's brew."—F. R. M. de Paula, "Some Further Notes on Auditing."

the market price should be taken.* These principles may require some modification in their application in war or other abnormal times. At such periods it seems not unreasonable to value assets at the price they may be expected to realise when the opportunity or necessity to realise them arises, or if the price of some commodities is written down because of the exceptional times. The price of others which have increased in present value, and seems likely to continue at that level during the exceptional period, may be increased. It is sometimes considered that the value, for balance-sheet purposes, of raw material should, if cost be taken, be the cost less the freight, when such cost is on the basis of a delivered price. If the material has to be resold, the freight is probably an unrealisable part of the cost, which should be provided against either by reduction of price or by a reserve. It has been previously mentioned that material or partly finished articles when transferred from one department to another should be priced at their direct cost only, and, as pointed out by Mr. William Lybrand, C.P.A., in an interesting paper on "The Accounting of Industrial Enterprises," read at an Annual Meeting of the American Association of Public Accountants at Atlantic City, New Jersey, this rule is also applicable in the case of a Trust or Merger Company in relation to its subsidiary companies. Mr. Lybrand points out that the purchase having been made by one subsidiary company from another, is in effect merely a transfer from department to department of virtually the same corporation, and not a sale on which the profit can be said to have been realised.

The principle that profits must not be anticipated would seem therefore to be applicable in such instances, and it

* The rule suggested by Mr. Pixley, "That nothing should be taken credit for at a higher price than the trader would be willing at that moment to pay for it for the purposes either of immediate sale or putting it by for a better opportunity of sale later on," does not seem capable of universal application.

would follow that a reserve should be provided equal to the amount by which such merchandise at inter-company prices exceeds its actual manufacturing cost. In the case of seasonal outputs of produce companies, it is considered that the balance of advantage is in the accounts, showing the profits of the season, and that stocks unsold at the balancing period can properly be taken at selling prices, provided they are in fact sold before the accounts are finally made up and presented. There are, however, many cases in which cost may fairly include interest (*vide* pages 119 and 120). The price of goods purchased necessarily includes a charge for interest plus profit. Profit may be considered as the extra remuneration for the risk undertaken above the normal rate of interest allowed when no risk is taken. In the case of contracts based upon a fixed rate of profit over cost, it would seem that interest might be fairly chargeable in cost at a rate per annum for the time in which the capital is employed. Such rate of interest would be independent of whether the capital was borrowed capital or share capital remunerated by dividend. Some confusion has arisen through it being thought that the interest to be included was to be based on the share and the borrowed capital of an undertaking. The interest included should be calculated on the capital employed for the particular work. Differences in the mode of raising the capital would probably make no great material difference in the ascertained cost of the product.

The rule is not, however, in Mr. Lybrand's opinion one of unreserved application, and he instances the case of an iron and steel combination controlling the manufacture of its product from the ore in the ground to the sale of the finished merchandise. In some cases there are a number of points in the process of manufacture where the merchandise reaches a finished and marketable stage. While at each stage in the manufacturing process some of the merchandise is sold to outsiders, much of it is transferred to other mills

for further manipulation at a price which includes some profit to the subsidiary company by which it was handled. Is it entirely unreasonable to claim that, where the manufacturing processes are distinct and complete, some manufacturing profit shall be taken in the current Income Account on merchandise finished by one company, but remaining in the inventory of another company while awaiting further transformation?

In the balance-sheet of a large industrial enterprise such profits are applied as a separate part of the Surplus Account distinct from the ordinary accumulation of surplus with a note appended setting forth clearly the nature of the item.

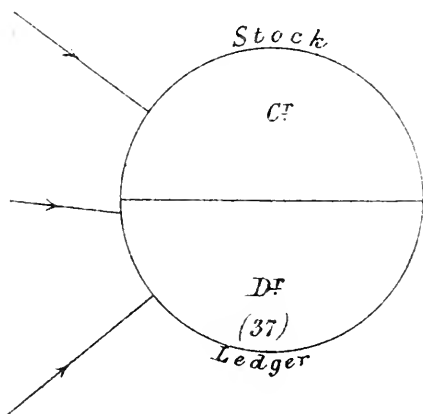
In the majority of cases manufactured stock has to be kept till a demand for it arises and orders are received. In the meantime it may deteriorate or the price may fall, or in certain cases it may go out of fashion. The system of valuing at cost has the additional advantage when stocks are held for any length of time, of obviating the necessity for periodical alterations of the valuation and consequent adjustment of the profit and loss account owing to fluctuations in the market price of the commodities. A valuation based upon cost, not including in the term standing charges and interest on capital,* would hold good for a long period of time; so long, in fact, as the article was preserved in its pristine condition, unless improved processes or other causes should so reduce the cost of similar articles as to render a corresponding reduction of the valuation of the old stock necessary in order to establish the proper relation between

* "To change interest into costs is in effect to add to these costs a certain amount of profit before it has been made, and is therefore against sound commercial and accounting principles."—Dickinson, *supra*.

it and the new price that would probably rule in the market. Any deterioration which the goods on hand may undergo through being old, out-of-date, or through other causes, should, of course, be periodically written off, and the stock thus brought down to probable realisable value. When stocks become entirely obsolete they should be reduced to their scrap value. Inordinate reduction in the value of assets however is not always a proceeding deserving unqualified approval. It is quite conceivable that by taking undue advantage of facilities and opportunities which may exist at particular periods for writing down the value of assets, the firm or company may be placed in the position during subsequent years of making book gains which would not be realised but for the previous artificial reduction in values, and in this way the accounts of the business are apt to prove misleading. It is well that this effect of excessive reductions in value should not be overlooked, indeed, its dangers appear to have been recognised by the Legislature, for, under the Companies Act, reduction of paid-up capital is limited to the amount which, according to the affidavits of responsible officials, has been lost, or is unrepresented by available assets. The old material on hand should be taken in a stores survey at the market value of such old material, or at the price at which similar old material was last disposed of, unless such price be higher than the market price, in which case the lower value should be taken. It is desirable that in both the Stores and Commercial Ledger old material should be kept in an account distinct from new material.

The amount by which stock is to be written down in respect of ascertained depreciation may be debited to profit and loss or subsidiary trading account, and credited to the Stock account in the Commercial Ledger through

IN STOCK.

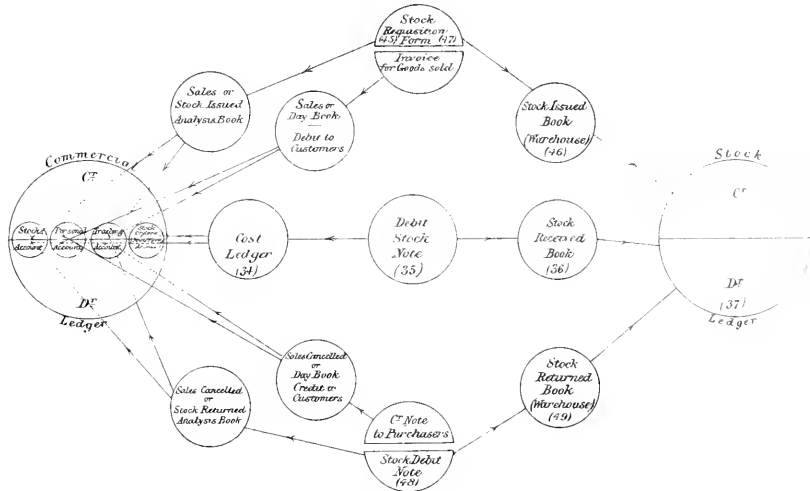


*and Plant, being contingent
agram.*

DIAGRAM V.

SHOWING THE RELATION OF THE BOOKS AND FORMS USED IN CONNECTION WITH STOCK.

(The numbers, where shown, correspond to the specimen rulings.)



The Transfers between Warehouse, Plant, and Store, and between Store, Warehouse, and Plant, being contingent and purely departmental adjustments, are not shown on this diagram.

the Journal. The warehouseman would pass a stock requisition through the Stock Issued Book to the credit of his Ledger accounts in the same way as if the amount represented withdrawal of stock ; and the same procedure applies in the case of reduction in the value of stores.

**Loss on
Stores and
Stock.**

Having referred to the more prudent policy of not including the expenditure of standing charges in the valuation of stock in hand, it may be desirable to point out that cases arise in engineering and other constructional establishments in which extensions are carried out by means of the plant and appliances of the firm instead of the work being entrusted to others.

If the revenue-earning power of the undertaking is increased by such additions, it is doubtless permissible to charge the cost to capital. In such capitalisation, however, care should be taken not to include any standing or other charges which would have been incurred, whether the extensions had taken place or not, and even a charge for the use of machinery and plant should be very carefully scrutinised, with the view of avoiding the inclusion as realised profits of amounts which are merely transfer profits between departments or branches. The saving that may be made by the work being done at cost must not be confused with a profit earned.

CHAPTER X.

SUBSIDIARY BOOKS.

IT remains to refer to some subsidiary books in use in factories and warehouses, which, although they have an important bearing on Factory Accounts, do not properly fall under any of the preceding chapters.

**Subsidiary
Factory
books.**

Not to detract from the main issues of our subject we have studiously avoided special reference to these ancillary books and matters, and we do not now refer to them with the view of attempting to exhaust the catalogue of account-books which in practice may be necessary in a factory. Such an attempt would be altogether futile by reason of the conditions and requirements of individual businesses varying too widely to warrant anything more than a general statement being made of the fundamental principles underlying the economy and routine of a factory—principles to which all details to be of service must conform.

In this chapter we shall first describe the method of book-keeping to be adopted in the case of plant or machinery acquired on terms of deferred payments, and mention a few considerations bearing on the subject of the accounts of Government and municipal factories, and on those of the workshops of railway and

**Summary of
Chapter.**

similar undertakings where expenditure and production are of the nature of auxiliary operations and have not for their primary object the raising of revenue or the making of profit. We shall then deal with a few of the books employed to record transactions with regard to such matters as cartage, van, wagon, craft, and railway traffic, packing, and fuel.

Inasmuch as the practice of purchasing plant on what is known as the purchase hire system is becoming more general,—there being in some circumstances an economy in the acquisition of new plant, machinery, wagons, etc., on terms of deferred payments,—it is desirable to consider the entries which should be made in recording such transactions. It has been suggested that a simple and safe method of dealing with the book-keeping pertaining to this system is to ascertain what will be the “ultimate” value of the object when the various instalments have been paid, and to divide this “ultimate” value by the number of the instalments, and credit the product to capital each time an instalment is paid, the remainder of the instalments being debited to profit and loss account. For example, it is suggested that in the case of a wagon purchased for £60, payable in twenty instalments, the ultimate value being £40, that as each instalment is paid £2 should be charged to capital and £1 to profit and loss account. The method suggested is undoubtedly a simple one, and in many cases it is probably as correct as the circumstances require. In the illustration given we assume that the “ultimate value” of the object—after the payment of all the instalments—covers an amount for depreciation during the time it has been in use; but in any case we

**Purchase
Hire
System.**

think it would be well that the amount charged under the various heads should be more fully specified. The difference between the cost value to the purchaser of an object acquired upon terms of deferred payments and its "ultimate," *i.e.* ordinary value, is the product of two factors, *viz.* interest on the deferred payments, and the natural or normal depreciation by use and deterioration in the value of the object during the period of hire. We submit that these factors are so essentially different that they should be separately recorded. The one bears a close relation to, and has to be considered in conjunction with, the capital account of the business, and the rate of interest borne by that account; the other is a trade expense which is regulated by the volume of business, and the corresponding wear and tear of the object and its tendency to obsolescence. An article after being acquired on the purchase hire system, should be debited to plant or other appropriate account at its value as if purchased for prompt cash, and the difference between that value and the aggregate amount payable under the purchase hire agreement should be taken to an interest on deferred payments account, the whole of the liability being carried to the credit of a personal account with the vendor of the article.

As the instalments are paid, cash account would be credited, and the personal account with the vendor would be debited, with the amounts of the instalments. The amount debited to plant or other account would be written down in accordance with the principles of book-keeping applicable to fixed capital, and already discussed, whilst the amount standing to the debit of interest on deferred payments account would be distributed over the period of hire. This is on the assumption that all the instalments are paid, and the purchase of the article ultimately

completed ; but should this not be the case, and the article be returned after an interval of hire, the personal account with the vendor would be closed by being debited with the balance standing to his credit, which would *pro tanto* be credited to the plant account and the interest on deferred payments account. Any remaining balances on these latter accounts, representing as they would the loss on the non-completion of the purchase, would be passed to profit and loss. A further advantage of this method is that it enables the article purchased on this system to be treated from the outset as if it were actually the property of the intending purchaser, and this, it will be recognised, is the only sound view to take of the transaction, as, although not the legal owner till the final payment is made, by the adoption of the liability he becomes the economic owner. If the purchase should not be completed, the accounts will show exactly what sacrifice is involved ; and they would, moreover, show the position of the transaction at any stage of the period of hiring.* The question of deductions from profits for Income Tax purposes on account of wagon hire purchase and the views or practice of the surveyor is, however, a factor to be borne in mind by the owner in determining the method to be adopted. This, however, now tends to uniformity in consequence of the scheme agreed to in 1914 between the Mining Association of Great Britain and the Inland Revenue Authorities, whereby the lessee furnishes the Income Tax Surveyor with a copy of the agreement, and a certificate from the wagon builder or some equally satisfactory evidence as to the price at which the wagons would have been sold for cash at the date of the agreement.

* The subject is discussed in detail in a lecture by Mr. F. Halsall, A.C.A., on "Railway Wagons under Hire Purchase Agreements." *The Accountant*, December 22, 1906.

The difference between the cost value and the amount payable is treated as "hire," and allowed in equal annual instalments over the term of the agreement as a deduction from profits for income tax purposes. In addition, depreciation is allowed off the cost value at 5 per cent. off the reducing annual balance, or at some other rate to be agreed. When "dead ends" are converted into spring buffers the improvement in value is to be deemed £5 per wagon, the balance of cost being treated as repairs, and the £5 added to the amount on which the annual allowance for depreciation is to be computed.

There is necessarily greater simplicity in recording expenditure in those cases where production is not for profit, and articles are made or repaired only for the sole and incidental use and benefit of the concern, as, for instance, in arsenals, dockyards, and other national and municipal workshops, railway, gas, tram, and water companies, often accounting under statutory regulations, than in a factory working for profit in competition with other producers. The principles of Factory Accounts explained in this volume are in all such cases applicable.

Whilst the requirements of a Government arsenal, however, are not those of factories working for profit, which have to be conducted on lines enabling the proprietors, in the face of keen competition with other manufacturers, to supply the demands of the public at a profit to themselves, it may, in passing, be mentioned that an ingenious and elaborate system of recording the expenditure in Government workshops by means of cards, on which the entries are made by symbols, has been described by Captain Metcalfe.* This method

* "The Cost of Manufactures." Captain Henry Metcalfe. New York : Wiley.

has much to recommend it, but it does not very well admit of the assimilation of accounts with a view of drawing up periodical statements showing the profit and loss on all the operations and the actual financial position of the concern. This is, in fact, admitted by the author himself, when he says: "I have vainly tried to find some simple current method of reconciling the cost sheet with the cash accounts, since this would establish the aggregate truth of the cost sheet before the highest court of audit known to military accountability. I am convinced not only that this is impossible, unless either the papers are very much complicated, or unless substantial truth is neglected for the sake of striking a balance; but I also believe that the same result is indirectly attainable by other means already described." Although the defect referred to may not be inherent in the system of recording expenditure on and by means of cards passing through a number of hands and performing a variety of services both in the factory and in the counting-house, efforts to establish such a system have not yet been very successful.

Other writers, who have recently advocated a card system, have considered that the difficulty referred to by Captain Metcalfe would be obviated by showing on a cost sheet at regular intervals or balancing periods, the total amounts shown by the cards as expended on all orders in progress at that date, as well as the amount expended on orders finished between that date and the last preceding date on which such entries were made. It is claimed for the card system that it is a labour-saving device, reducing the volume and cost of clerical labour employed in recording the expenditure of labour and material. This claim, if substantiated, has further to be considered in relation to the more detailed attention which has to be given by a manager or principal to the examination of costs recorded

on a number of cards, than he has to give to costs recorded in a book in which the entries follow consecutively. This objection is partly met by the institution of a system of "comparison cards," but as the preparation of these cards means a summarising and recording of the contents of a large number of cards each recording one item only, the saving of clerical labour is not very apparent.*

In almost every manufacturing business the item of cartage is a more or less serious factor. If the cartage be for the conveyance of raw material from different parts of the factory, the charge is one on manufacturing account, and should be allocated to the various orders. If it be for the delivery (by road, rail, or water) of goods sold to customers on the basis of price at the sellers' works, the customer is debited with the expense. In other cases it is borne absolutely by the firm and is considered in fixing the price, and regarded as a charge against the profits of the business. In any event the item is one admitting of large economies, by a proper system of registration. If cartage be done by an outside contractor, the necessary records for checking his accounts should be kept by the employee (generally the warehouseman or storekeeper) by whose orders the work is done. The contractor would receive an advice (Specimen No. 51) which should be attached to the account when rendered.

If it be thought necessary, a further check may be obtained by instructing the gatekeeper to record the times at which carters enter and leave the factory, any

* Interesting particulars of methods adopted under card systems are to be found in a paper on "Workshop Administration," by Mr. David Cowan, published in the *Transactions of the Institution of Engineers and Ship-builders in Scotland*, and in the "Complete Cost Keeper," by Horace Lucian Arnold (Henry Roland). *Engineering Magazine*.

delay in loading or unloading being noted. If the horses and vehicles are the property of the firm, the purchase price of the horses should be debited to a horse **Horses and vehicles.** account, and that of the vehicles to a vehicle account, and each account should periodically be debited with interest on the amount of the capital sum. The carters should send in weekly a return of the work done by them, and this should be summarised in a Cartage

SPECIMEN No. 51.

Cartage advice, _____ 19 .

To Mr. _____

Please supply me with the undermentioned.

| No. of Horses. | Description of Vehicle. | Time Required. | Time Arrived. | Time Returned. | Time on Job. | Order to be charged. |
|----------------|-------------------------|----------------|---------------|----------------|--------------|----------------------|
| | | | | | | |

Ordered by _____

Signature of Carman _____

Book. A cartage account should be opened, to which should be debited the wages of the carters, stablemen, the cost of forage, stable expenses, etc., and at regular intervals an amount from the horse account and the van account for depreciation. The depreciation on the horse account can,

it is thought by many, be best provided for on the basis of annual revaluation, rather than on the basis of a yearly depreciation rate. The cartage account will, of course, be credited with the journeys performed at such rates as will equal the amount charged to it. It is only through keeping some such account that the employer can ascertain accurately whether it pays him better to purchase and keep horses and carts than to employ a contractor. In the consideration of the results thus shown, the proprietor if he has an agreement with the War Office by which he obtains a subsidy for keeping a certain number of horses in stock, on which the War Office can draw if the necessity arises, has to bear this relevant fact in mind. Procedure similar in principle should be adopted when transport is by means of motor lorries or similar vehicles. In such case, and until reliable data based on experience is obtained, the important consideration will be the adequacy of the charge for depreciation. In view of the larger capital outlay necessitated by the use of motor vehicles, it is desirable to establish checks on the loading of the vehicles, and to ascertain cost on the basis of a combined mileage and weight factor generally described as a ton mileage basis. In many cases this unit of cost can be usefully and informatively supplemented by one which takes cognisance of time, and shows the ton mileage on an hourly basis.

In view of the need that often arises of giving quotations for goods inclusive of free delivery, and of checking the rates charged by the railway companies, it is very desirable to record the quotations obtained, or rates paid, for freightage. At present many of the provisions of the Acts of Parliament which have been passed for the protection of consignors and consignees are in abeyance, or in course of modification, under the new

**Freight
book.**

procedure instituted by the Railways Act of 1921. It would seem desirable, however, pending the bringing into operation of the whole of the new procedure, to briefly summarise the main principles of the legislation now under revision. Under the various Railway (Rates and Charges) Order Confirmation Acts passed in 1891 and 1892, consequent upon the Railway and Canal Traffic Act of 1888, the maximum tolls and charges for various classes of traffic over the various railways were prescribed. By an Act of 1894, the railway companies could not increase their rates without public notice, and, subject to the provisions of the Railway Rates Act of 1913, they could be called upon to justify such increase of rate before the Railway and Canal Commission Court. In checking the accounts or the rates quoted, the classification of the traffic should receive primary consideration. Having regard to the varying conditions of the traffic, it was very desirable to compare the actual rates charged with the maximum authorised, and this could best be done by means of a book ruled as shown (Specimen No. 52). The goods should be delivered to the railway company on a "Consignment Note," prepared by the senders. If a form prepared by the railway company is accepted for use, it should be carefully examined to see that none of its clauses create a special contract with regard to owner's risk or other matters, and that the railway company are not by any of its clauses released from their special or general liabilities.

Care should be exercised in declaring the weight and character of the merchandise consigned, as the Railway Clauses Consolidation Act prescribes heavy penalties in cases of fraud. Accuracy in these matters is of importance to the consignor, the railway company, and the consignee.

In the case of firms enjoying the advantages of a railway siding, a special book should be kept on the same principle as that applied to the Cartage Book just described. If a yearly rental is paid for sidings and trucks, this rental and any incidental items should be debited to an account to which is credited any receipts from this source. If the siding is on land belonging to the owner or occupier of the works, and if it has been laid or is maintained by such owner or occupier, the railway rate charged him, either for the receipt or forwarding of goods, should not contain a charge for the provision of such terminus, or if it does, the owner of the siding is entitled to a rebate or allowance. The railway company may, however, have a right to make a charge for services rendered at or in connection with sidings not belonging to the railway company. The Association of Traders known as "The Mansion House Association on Railway and Canal Traffic," carefully watches all proceedings in connection with private sidings and other matters which come before the Railway and Canal Commission Court, and from time to time notifies its members of the decisions of that Court in test cases, and through this channel manufacturers can obtain much information enabling them to check in principle the accuracy of the constituent items in the railway rates charged them.

If the trucks are owned by the firm, then their purchase price, together with interest, should be debited to a Wagon and Van Account, which should be credited each year with an amount for depreciation, the amount so credited being charged to an account which would in turn be credited with any amount received for the use of the vehicles.

A Wagon and Van Book should also be kept, showing under the number of the wagon or van the date it was

dispatched, destination, load, date of return, and number, if any, of days' demurrage incurred. The book should be so ruled as to permit of the earnings of the wagons and vans being ascertained, and the results tabulated monthly in a form convenient for comparison, as shown in Specimen No. 53. The book should also give the dates on which the wagons or vans are tared. There are considerable variations in tare owing to weather and other causes, and it is desirable that the weight of the vehicle itself should be verified from time to time. The cost of maintenance of wagons and vans should also be kept in the same book, or in a Wagon Expenditure Book. In either case the amount provided or written down yearly for depreciation and obsolescence should be included. The financial results of the working of the wagons and vans would then be obtainable in detail.

When wagons or vans, belonging to manufacturers or merchants, have to be repaired on the railway company's sidings by a wagon-repairing company or by the railway company's workpeople, it is advisable to keep a record of such repair in a Wagon Journey Repairs Book (Specimen No. 54). In large establishments better utilisation of wagons and vans and the avoidance of demurrage charges can be brought about by the use of tabulating boards or tables so constructed that by means of indicating tablets and pins the position of any wagon or van, and the length of time it has been in that position, may be known from hour to hour by the head or controller of the wagon department.

It may also be serviceable to allude briefly to the desirability, where steam lighters or barges are used, of recording the work done by each lighter or barge, so that full advantage may be taken of any possible economies in cost of transit.

The captain or hand in charge of each craft should be given a Time Sheet (Specimen No. 55).

The Time Sheet may be so ruled on the back as to permit of the recording thereon of any back freights,

SPECIMEN No. 54.

WAGONS REPAIRED BY _____

| No. | Dates. | | Station or siding. | Materials sent. | Nature of Repairs. | Carriage on Materials. | Charges. |
|-----|----------|-----------|--------------------|-----------------|--------------------|------------------------|----------|
| | Advised. | Repaired. | | | | | |
| | | | | | | | |

SPECIMEN No. 55.

TIME SHEET FOR { LIGHTER.
BARGE.
BOAT.

| Name of Craft. | Date and Time of leaving Works. | Loaded with | Quantity. | Destination. | Date and Time of Arrival at Destination. | Date and Time Discharged. | Date and Time started Return Journey. | Date and Time of arrival at Works. |
|----------------|---------------------------------|-------------|-----------|--------------|--|---------------------------|---------------------------------------|------------------------------------|
| | | | | | | | | |

return cargoes, towage, or other services performed, and will form the voucher on which payment will be made by the cashier of the amount due to the crew when the journey is finished.

This Time Sheet should be recorded in a Craft Register (Specimen No. 56).

This Register may also usefully contain a record of the earnings of the craft whether from the carriage of raw material to, or finished products from, the factory, the carriage of goods on return journeys for other manufacturers or persons, or from the towage of other craft on the

SPECIMEN No. 56.

CRAFT REGISTER.

THE _____, CAPTAIN _____, 19

| Date Loaded. | Where Loaded. | Destination. | Time Sheet No. | Date Arrived. | Time Occupied on journey. | Particulars of Discharge. | Date of Return. | Time Idle. | Material Carried. | Particulars of Payment. |
|--------------|---------------|--------------|----------------|---------------|---------------------------|---------------------------|-----------------|------------|-------------------|-------------------------|
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waterways navigated. It is desirable that the class of earnings as well as of expenditure should be kept distinct. The cost of towage of craft not moved by steam or other motive power should be recorded in a Towage Book, the cost for each barge or other vessel being kept separately.

In cases in which stores, wharves, or warehouses are used for the storage or stocking of a commodity or commodities in bulk, it is found to be of great assistance in the practical administration of the business if the stocks on hand are reported on a diagrammatic form, which shows the position of the various component parts of the stock in the store, the wharf, or the warehouse relative to the loading or unloading facilities with which the depôt is equipped.

In dealing with the question of transit of goods, it will be well to point out that casks, cases, containers, skips, sacks, bags, barrels, syphons, tarpaulins, and sheets for the packing or covering of goods should be considered as package stock, and should be registered. In some cases the package is of more value than the contents. The cases, tarpaulins, sheets, and other forms of package should be made to a Stock Order No., and credited to stock in the same way as any other articles, and should bear distinctive and consecutive numbers. Thus a cases or sheets account respectively would be debited with the cost of each case or sheet sent out, and credited with all charges made to customers under these heads. If any allowance be made for the return of a case, the case should be put into stock at a figure not exceeding the amount so allowed, and the process would be repeated until it was no longer of value as a packing-case but merely as old material.

It is further desirable that the warehouseman should keep an "empties," "cases," or "returns" book, showing the packages sent out and those received back, in order to keep an effectual check upon, and prevent the loss or too rapid multiplication of packages of various descriptions. Credit notes issued or cash paid on the return of these coverings should be systematically recorded.

This register should always be open to the inspection of the head of the packing-case makers' department, or he should be advised daily by the warehouseman of the packing-cases that have been returned. It is also necessary that the storekeeper should carefully record all the packing-cases received by him from suppliers of goods, and the dates on which they were returned. In the case both of Stores and Stock the cost of coverings should be kept distinct from the prices of the raw material and the finished

goods. Provided records are kept of their receipt or manufacture, and return or issue respectively, the articles themselves can be considered as constituents of Stores or Stock, and dealt with on the same principles as regulate transactions in other articles.

There are many other subsidiary books of a similar character, the need for which will arise in every factory, but their detailed description is outside the scope of **Coal Book.** this work. Such are the Coal Test Book for recording calorimetric analysis, the Coal Book for recording the contracts for coal and deliveries made, as well as the consumption of coal, when this is systematically charged to each working number, as explained in previous chapters. If this procedure be adopted, the Coal Book may contain on the debit side the turn-out weight of coal received, under the heading gross, tare, and net, and be compared with the entries in the columns of weights advised. The credit side would give an account compiled from the statement (already referred to) showing how the coal has been used. The difference between the debit and credit sides would represent the balance of coal on hand. The Coal Book and accounts may usefully be summarised monthly (Specimen No. 57), to show the various elements in the price at which it was bought, and is also serviceable for checking the accounts for coal supplied. The record of the weight of coal and the truck or wagon containing it is first made, both as regards gross, tare, and net, in the Weighing Machine Book kept at the Weigh House. The weights of all vehicles and goods passing over the Weighbridge are entered in this book, a carbon duplicate being sent to the office. A record should also be kept of all inspections or tests of weighbridges, weighing machines, or weights, whether such tests are made by the proprietor or by a firm engaged by him to maintain

and test such weighing apparatus. Such register of inspection is of considerable service in connection with any proceedings under the Weights and Measures Acts. A somewhat similar service is performed by the Machinery Examination Register, recording the dates on which the various machines should be, and were, cleaned and inspected. There are also the Surprise Visits Book recording the

SPECIMEN No. 57.

SUMMARY OF QUANTITY AND COST OF FUEL RECEIVED
DURING THE MONTH OF _____ 19

| Date of Purchase. | Colliery or Merchant. | Quality. | Quantity. | | Bought Price. | Discount. | Pit Price. | Wagon Hire. | Boat Hire. | Rates and Tolls. | Net Amount. | | | Re-marks. |
|-------------------|-----------------------|----------|-----------|----|---------------|-----------|------------|-------------|------------|------------------|-------------|--|--|-----------|
| | | | T. | C. | | | | | | | | | | |
| | | | | | | | | | | | | | | |

visits at irregular periods and unusual hours of the principals or leading officials, with notes and observations as to the condition of affairs at the time such visits were made.

Gas, Water, and Electricity Meter Reading Books, which show the readings of the various gas, water, and electricity meters at regular periods, and the consumption during such periods, whilst by the aid of subsidiary meters the consumption in different parts of the factory is obtained and the cost

localised. There is also the Brigade or Fire Hose Book, in which is recorded the periodical examination of the hose and apparatus for the extinction of fire, as also the number and position of the fire-buckets, the names and addresses of the men (usually those resi-

Gas, Water, and Electricity Books.

Precaution against fire.

dent near the works) who constitute the brigade, and the record of the date of consent of the owners of the street mains to the attachment of the hose pipes in case of need ;

Patterns. the Casualty Book, containing records of accidents which happen in the factory ; the Pattern Book, containing particulars of patterns received and issued, in which each pattern is referred to by its symbol or number, a constituent therein being the office number of the Drawing, the Patterns Ledger showing the original cost of each set of patterns, and the amounts from time to time written off such cost ; the Delivery Books, for obtaining carriers' receipts for goods ; the Visitors' Book, recording the names of visitors to the works, the dates and purpose of such visits, with, in some cases, a portion of the book set apart for the autographs of distinguished visitors ; the Stores Delivery Diary or Calendar of Deliveries due, used for entering the due dates of stores ordered, and by daily examination leading to systematic reminders to suppliers of overdue goods ; and a variety of other books too numerous to be enumerated. In many industries, especially those in which operations are influenced by weather or atmospheric conditions, a Weather Chart Book may advantageously be kept, recording meteorological conditions during working days.

There are also a number of books facilitating the working and general oversight of the business by the principal or his assistants, which, although they do not necessarily form part of the system of accounts, afford data for comparisons of expenditure in different periods on general and establishment charges. Among such books may be mentioned the Staff Register, containing the names, addresses, position, and salaries of members of the staff ; the Stationery Register, containing a record of the quantities and qualities of the books, forms, prints, and papers ordered, with the

names of their suppliers, and the costs, with the reference numbers, and code letters or symbols appearing on the forms, thereby enabling the last supplies to be traced ; the Catalogues Issued Register, chronicling the various dates of issue of catalogues, and the names and addresses of those to whom they were issued ; the Advertisement Contract Register, containing particulars of contracts entered into or orders given for advertisements, with specimens of the advertisements, and the rates at which they are inserted ; the Notices Book, containing copies of all notices issued to the staff or members thereof, or posted in the works, with regard to the conduct of the business ; the Licences Book, recording all licences taken out or to be taken out, whether in connection with the storage of gun-powder or other explosives, or inflammable oils, for the employment of male servants as coachmen, for light locomotives, or for any purposes for which licences have to be taken out ; the Boiler Inspection Book, containing records of the inspection of the boilers, and a copy of the report which, under the Factory and Workshop Act, has to be entered in or attached to the general register of the factory or workshop, showing the result of such inspection by a competent person.

A reference to books relating to sick, provident, superannuation, and similar funds might be looked for in this chapter, but inasmuch as these are generally conducted by a committee of those interested, a description of the books required does not fall within the limits of this volume. For the convenience of the employees, their subscriptions to these funds may, as described in Chapter II., be deducted from the amounts due to them as wages, but at this point the connection of the funds with the factory books generally ends. The disposal of the amounts deducted from the wages of employees

**Provident
and other
funds.**

on account of fines, rests of course with the principal, in the absence of any other arrangement with the employees. If, as is often the case, they form a contribution to the sick fund, the necessary entries are made in the commercial books.

The books which have to be kept under the Factory and Workshop Act also require to be mentioned. We do not, however, consider it necessary to describe them in detail, as all registers, books, forms, certificates, etc., prescribed by the Secretary of State in pursuance of the Act can be purchased ready for use.* The Act deals with the sanitary conditions of factories and workshops, and with the safety of the workpeople, fixes the hours of work and of meals, prescribes holidays, provides for the education of children employed in factories, requires certificates of fitness for employment to be obtained, and contains regulations as to the investigation of the cause of accidents. The Act also contains conditions as to overtime, night work, domestic employment, etc., and special provisions for particular classes of factories and workshops.

It is also desirable that one or more of the responsible officials at the works should be well posted as to the provisions of the Public Health Acts, the Notice of Accidents Act, the Trades Boards Act, and other Parliamentary enactments relative to labour, as also in the bye-laws of the local authorities of the district, particularly those relating to the emission of black or other smoke, and as to sanitation. Copies of the local bye-laws should either be posted in the works, or supplied to the foremen or leading hands. Where electricity is used, the regulations issued by the Home Office with regard to such user in factories

* A useful summary of Government Regulations appears in "Factory Administration and Cost Accounts." Elbourne. The Library Press.

should be posted in the offices of those responsible for such regulations being effectually carried out, as should also the regulations published by the Home Office under the Factory and Workshop Act (1901), as to the use of locomotives and wagons on private lines and sidings.

APPENDIX A.

NOMENCLATURE OF MACHINE DETAILS.

BY OBERLIN SMITH, PRESIDENT OF THE FERRACUTE MACHINE
COMPANY, BRIDGETON, N.J.

*A Paper read before the American Society of Mechanical Engineers,
and reprinted by the kind permission of the Author.*

THAT the nomenclature of machinery, and of the tools and apparatus with which it is constructed is, in this country, in a state of considerable confusion scarcely needs demonstrating. If we look from an international point of view, and include the other English-speaking countries—Great Britain and her colonies—the confusion becomes worse confounded. A reform is destined, in due time, to come, doubtless to be promoted in great degree by such societies as ours. This reform movement cannot be begun too soon, and should aim at giving brief and suggestive names to all objects dealt with,—each object to have but one name, and each name to belong to but one object. A simple method of beginning such a reform would be a common agreement among all our engineering schools to use each technical word in but one sense, and with no synonyms. A lesser field of reform and one which lies more particularly within the jurisdiction of individual manufacturers, is the comparative designation of a number of sizes or kinds of the same machine. There is now no common understanding whether a series of sizes shall be numbered or lettered from the largest down, or from the smallest up. The latter is undoubtedly the most natural and suggestive method, but usually becomes confused by want of careful forethought (when starting a series) in providing “gaps” for the insertion of future sizes. If a numerical series has been already started and become commercially established, the only systematic way to insert new sizes

(either at the beginning or through the middle of the series) is to use fractional numbers. This, though awkward in sound and appearance, seems to be the only means of suggesting the comparative size of the article by its name. The use of arbitrary higher numbers between the other is, of course, worse than no numbers at all. The use of a series of letters does not supply this fractional loophole of escape, the euphony of A-and-a-half, K-and-three-quarters, etc., being somewhat doubtful. Another method in much favour is the use of "fancy" names such as "Diminutive Giant," "Eureka," "Firefly," etc. These are far preferable to confused numbers as they are not intended to convey any ideas between manufacturer and customer, and admirably succeed in their purpose. All this is a very difficult subject to deal with, and one in regard to which we can scarcely hope for any exact system. We can but point out to manufacturers two general principles to be followed: 1st, of leaving abundant *gaps*—that is, let a regular series run 10, 20, 30, 40, etc., instead of 1, 2, 3, 4, etc.; and 2nd, of using the smaller numbers for the smaller objects. The second is similar in idea to the well-known Philadelphia house-numbering system, which has worked so admirably in practice, and which has been copied by numerous other cities.

The two foregoing paragraphs are intended respectively as but casual allusions to the technical and commercial nomenclature of machinery in general. The subject is too elaborate to be treated at length in this paper, the main purpose of which is to set forth the results of the writer's experience in establishing a system of names and symbols for all the component parts, commonly called "details" of machines, or, in fact of any manufactured articles.

That some such system is necessary, no engineer who has attempted to manufacture machinery by the modern system of duplicate (or approximately duplicate) parts, will, for a moment, question. The necessity for a specific name for each piece, which name is not, never has been, and never will be, used for any different piece of the same or any other machine, is evident, simply for purposes of identification. This identification is required mechanically at almost every stage of production. The name, or a symbol representing it, should be marked upon the drawings, the patterns, and the special tools pertaining to each piece, and, when convenient, upon the piece itself. Commercially, it is required on time cards and in indexes and pattern lists and cost books as pertaining to production. Pertaining to sales these names or symbols must appear in illustrated price lists, and in orders by and charges

to customers. This, our modern method of repairs, by selling duplicate parts, renders imperatively necessary.

The requisites for a good system of names and symbols are : 1st, *isolation* of each from all others that did, do, or may exist in the same establishment ; 2nd, *suggestiveness* of what machine, what part of it, and if possible, the use of said part—conforming, of course, to established conventional names, as far as practicable ; 3rd, *brevity*, combined with simplicity. Of the importance of isolation to prevent mistakes and confusion ; of suggestiveness to aid the memory ; of brevity to save time and trouble, it is hardly necessary to speak.

Regarding the systems now in use in our best shops, this paper will not attempt detailed information. It is understood that the names are more or less scientifically arranged ; depending, of course, upon the amount of study and the quality of the brains that have been expended upon them. In cases where symbols are used, supplementary to the names, they usually consist of letters or numbers, or (oftener) a combination of both. Many of them (both names and symbols) fail in symmetry and suggestiveness, because little attention has been paid to the names of the machines themselves, as regards the serial consecutiveness hinted at in paragraph 2nd. The quality of brevity often suffers, severely, because the name and symbol must, in most cases, each have the machine name prefixed, to secure their perfect isolation. The latter quality is rarely dispensed with, simply because the manufacturer's pocket would be too directly touched by the expensive resulting mistakes. A perusal of some machinery catalogues which give detailed lists of parts is very harassing to a systematic mind. They are apt to derive one part name from another, prefixing the latter as an adjective each time, until some such pleasant title as "lower-left-hand-cutting-blade-set-screw-lock-nut" is evolved. If there are symbols provided, they consist of some unknown combinations of letters part way down the list, and then change to arbitrary numbers, or perhaps to nothing at all. It will often be noticed also that no particular order appears to be followed in numerical arrangement, similar parts being scattered at random through the list.

The scheme to be described further on has been evolved gradually from the experience gained in managing a growing machine business. This scheme is far from perfect, and is probably inferior to others which have not been made public ; but it seems to answer the purpose aimed at, viz., a comprehensive and elastic system which will accommodate itself to an unlimited

growth and any variation in quantity or kind of goods manufactured. This, the methods we first tried would not do, being too limited in their scope.

It should be here explained that the word "we," as just used, refers to the above-mentioned machine works, with which the writer has long been connected; and the scheme in question will be spoken of as "our symbol system." To further define terms: "machine name" and "machine symbol" refer respectively to the name and symbol of the whole machine—or other article of manufacture; for it will be noticed that the system is applicable to almost any products, except those of a textile or chemical nature. "Piece name" and "piece symbol," in like manner, refer to the separate pieces of which the whole is composed. The terms "detail," "part," and "piece," have so far been used synonymously. It is doubtful which is really the best to establish as a standard, but we have adopted "piece" as best expressing the idea of one piece of material, reduced to the last condition of subdivision. In our practice, exceptions are made to this requirement of homogeneousness in such cases as chains, ropes, belts, etc.,—also material glued or welded together—in short, anything which may (like a man) be called *one piece*, because it is not intended ever to be taken apart. The character for equality (=) will be used to show connection between a name and its symbol. A brief glance at the history of our system shows that at first we (like many others) hit upon the plausible idea of using numbers for machine symbols and letters for piece symbols. The numbers were somewhat "gapped," but not to such an extent as we now should practise. Examples: If four sizes of pumps were symbolled 1, 2, 3, and 4, their barrels might = 1-A, 2-B, etc., and their handles = 1-B, 2-B, etc. If the next product made was a series of lathe dogs, they would probably be symbolled 11, 12, 13, etc. Their frames would = 11-A, 12-A, etc., and their screws, 11-B, etc. This all worked beautifully until the products became so complicated as to contain more than twenty-six pieces! After tampering a little with the Greek alphabet (which seemed calculated to scare our new workmen), and trying to use a mixture of small and capital letters (which looked too near alike), we fell back upon the clumsy device of repeating the alphabet, with letters doubled or tripled.

When we finally abandoned the above plan, several methods were carefully studied. The next most obvious was to use letters for machines and numbers for pieces. This allowed any quantity of the latter, but limited the machine to twenty-six even with no gaps

provided. A certain modification of this method is, perhaps, more in use than any other system. In it letters are used for different sizes or styles of a certain kind of machine, and used over again for some other kind *ad infinitum*. This answers the purpose, because there are not likely to be more than twenty-six varieties of one machine. It has, however, the fatal objection of requiring the whole machine name prefixed to each symbol, in all cases where the symbol stands alone, and does not happen to be written with the others of the set in tabular form. As the general name of a machine usually consists of at least two words, a complete piece symbol becomes too long for convenience in labelling. Examples: Force pump, K—26; Lathe dog, H—2.

Another system consists in using numbers for the machines and numbers for the pieces. This gives isolation and brevity, but no suggestiveness. A serious objection to it is the danger of blurring the numbers together, or of transposition in writing or reading them; also in the fact that either number cannot be used alone, as it can in the case of letters and numbers.

A similar system to the above consists in the use of letters for both symbols. It has the same disadvantages, and the additional one of a limitation in the quantity of letters at disposal.

Our system, as finally decided upon, is as follows: Machine names and piece names are determined by the designer, in general according with the principles already pointed out, being, of course, made as brief and suggestive as possible, with no two machine names alike, and no two piece names alike in the same machine. In this nomenclature no positive laws can be followed but those of common sense and good English. A *machine symbol* consists of a group of *three* arbitrary *letters*—capitals. A *piece symbol* consists of an arbitrary *number* and follows the machine symbol, connected by a hyphen; thus FPA-2 might symbolise the force-pump handle before alluded to—smallest size. The machine symbol may, be used alone when required, as FPA.

As thus described, these symbols fully possess the qualities of isolation and brevity. To make them also suggestive, some attention must be paid to what letters to use. In practice, we aim to make the first two letters the initials of the general name of the machine, and the last letter one of an alphabetical series which will represent the sizes of the machine. An example of this is shown in the symbol for the smallest-sized force pump FPA. If there is any chance of a future smaller or intermediate size, gaps should be left in the alphabetical order. This "initial" method cannot always be strictly followed, because of such duplicates as

FPA for force pump and foot press. The remedy would be to change one initial for one beginning some synonymous adjective, that is, foot presses might be symbolised TPA, assuming that it stands for treadle press. Usually the least important machine should be thus changed. From this it will be seen that, in defining the theory of this scheme, the words "arbitrary letters" were purposely used. The idea is to make the system thoroughly comprehensive. There might be such a number of machines having identical initials that the letters would be almost arbitrary. In practice, the designer can usually succeed in making the symbols sufficiently suggestive.

In considering how many letters to use in a symbol, considerations of brevity advised two, suggestiveness three or four. Two letters did not allow of enough permutations, nor indicate well enough the kind and size of machine. Three seemed amply sufficient in the first respect, as it provided over 17,000 symbols. If, for any reason, in the future four letters should seem desirable, the addition of another would not materially change the system. If three letters hyphenated to a number of one, two, or three digits should seem bulky, remember that this symbol can stand by itself anywhere and express positively the identity of the piece. Its comparative brevity is shown by comparing the second and third columns of the following table (A). In the different lines an idea is given of the application of the system to a variety of products not usually made in any one shop.

TABLE A.

| 1st. | 2nd. | 3rd. | 4th. | 5th. | 6th. |
|---|--------------------|------------------------------|-----------------------|-----------------------|--------------------------|
| Full name of machine and piece. | Our Symbol for it. | Symbolic name as often used. | Characters in Col. 2. | Characters in Col. 3. | Excess of Col. 5 over 4. |
| 6" x 4' Engine lathe, spindle head | ELA-4 | Engine Lathe, A-4 . . . | 4 | 13 | 9 |
| No. 4 Power Press, frame | PPD-1 | Power Press, D-1 . . . | 4 | 12 | 8 |
| 7" x 14" Steam Engine, crank shaft | SEG-51 | Steam Engine, G-51 . . | 5 | 14 | 9 |
| Buckeye Mowing Machine, left axle nut | MMD-81 | Mowing Machine, D-81 | 5 | 16 | 11 |
| No. 3 Glass Clock, main spring | GCC-105 | Glass Mantel Clock, C-105 | 6 | 20 | 14 |
| One-hole Mouse Trap, choker wire | MTA-3 | Wooden Mouse Trap, A-3 | 4 | 17 | 13 |

TABLE B.

| FPL | No. 3 FOOT PRESS. | | Weight. | | | | | |
|-----|-------------------|---------|-----------------------------------|-----------|-----------|-----------------|------------------|----------------------------|
| | Piece No. | Same as | Piece name. | Material. | Quantity. | Rough weight. | Finished weight. | Aggregate finished weight. |
| | 1 | | Frame | Cast Iron | 1 | 220 | 200 | 200 |
| | 2 | | Gib | " | 1 | 10 | 9 | 9 |
| | 3 | | Side Bar | " | 1 | 45 | 40 | 40 |
| | 4 | | Front Leg | " | 2 | 30 | 30 | 60 |
| | 5 | | Back Leg | " | 1 | 40 | 40 | 40 |
| | 6 | | Treadle | " | 1 | 17 | 15 | 15 |
| | 7 | | Lever | " | 1 | 85 | 80 | 80 |
| | 8 | FPH-8 | Lever Weight . . | " | 4 | 5 | 5 | 20 |
| | 9 | | Pitman | " | 1 | 12 | 10 | 10 |
| | 10 | FPH-10 | Clamp Sleeve . . | " | 2 | 3 | 2 $\frac{1}{4}$ | 4 $\frac{1}{2}$ |
| | 21 | | Lever Pin | Steel . . | 1 | 2 $\frac{1}{2}$ | 2 | 2 |
| | 26 | FPJ-26 | Treadle and Pitman Bolt | Iron . . | 3 | $\frac{3}{4}$ | $\frac{1}{2}$ | 1 $\frac{1}{2}$ |

Table B is a specimen of part of a page of our "Symbol Book," in which are recorded any machines which have arrived at such a state of perfection and saleability as to be marked "Standard" on our drawings.

This table almost explains itself. The piece numbers in 1st column do not have the letters prefixed, because the latter stand at the top of the column. "Same as" means that the piece is identical with a piece belonging to some other machine, and can be manufactured with it. If it is common to several machines in a set, the smallest of the set in which it occurs is given. The "quantity" column tells the number of pieces of a kind required. The last "weight" column, added upward, shows total weight of machine. The piece numbers are "gapped" after each kind of material and also at the ends of "groups" as described further on. This is to allow for future changes and additional pieces; also that other nearly similar machines, having more pieces, may in general have the same piece numbers.

The order in which the pieces are numerically arranged cannot follow positive rules in all cases. In our list of instructions (too long to be here quoted) we direct a classification by *materials*. In each class we group pieces of the same general character, in regard to the prevailing work to be done upon them, and in natural "machine shop" order; *i.e.*, first planing, then drilling, or boring, then turning. We also aim to place the heaviest and

most important pieces first. Between each group we "gap" the numbers.

Regarding position in naming pieces, we assume a front to the machine (where the operator is most likely to be placed), and define direction tersely as "forward," "back," "right" "left," "down," "up." The adjectives of position prefixed to piece names are, of course, derived from these words, as "upper," "lower," etc. A perpendicular row of similar pieces, say five, would be rated "upper," "second," "third," "fourth," and "lower." A number of different-sized pieces of similar name may, in like manner, be prefixed "smallest," "second," "third," etc.

Before closing, a brief reference to certain (two) supplementary symbols may not be out of place. One is a small letter after a piece symbol (as FPL-21-a), signifying that the piece is obsolete, the standard FPL-21 having been altered.* After a second alteration, the last obsolete piece would be suffixed "b," and so on. Thus duplicate pieces of old-style machines can be identified and supplied to customers. The other symbol referred to is to indicate the number of the operation in the construction of a piece, and is written thus: FPL-21-1st, FPL-21-2nd, etc. Its use is of great value on detail drawings, time cards, and cost cards. It enables any operation (no matter how trivial), on any piece of any machine, to be identified by a symbol alone. An *operation* we define as any work which is done by *one person at one time*, before passing the piece along and commencing upon another.

* In a letter to the authors, Mr. Oberlin Smith writes: "I have not yet changed the system in my own practice, and do not see anything which I think it desirable to change except the first *supplementary* symbol mentioned in the first part of the last paragraph. The principle there mentioned is not strictly logical, as it gives the same symbol to a piece in present use which in a previous year was given to a somewhat different one now obsolete. This matter I intend to modify somewhat, but have not yet had time to do so."

APPENDIX B.

THE RATING OF FACTORIES CONTAINING MACHINERY.

As, for a long time, questions have arisen as to how far machinery and plant is to be taken into consideration in estimating the rateable value of the premises in which the business is carried on, it may be useful to give a brief outline of the present position of this subject.

Questions as to rateability.

The assessments originate with Overseers of the Poor, and assessment committees, and in practice the greatest diversity prevails in computing them. When there are a few small factories in a district the value of the machinery is often ignored in framing the assessment, which is in such cases based on the estimated or actual net rental value, as with a shop or dwelling-house. In districts in which industry is localised the assessing authorities often take the capacity of production as the guide to the assessment, and base their computations on the spindle, horse-power, or other common factor in the trade,* whilst in many instances the assessors have adopted rules originally intended for very different kinds of property, or formulated entirely new

The assessing authorities.

Varying modes of assessment.

* Such an assessment does not take cognisance of the wear and tear of machinery and its tendency to obsolescence, and thus bears unduly and unfairly against those factories which have been longer established than their rivals, and are already burdened with older type machinery. In a pamphlet on the "Incidence of Local Taxation," Mr. Hedley states that in 1883 the Hunslet Union Assessment Committee decided to disregard the law laid down by the High Court (in the Bishopswearmouth case) and resolved to exclude

modes of valuation. This want of uniformity as between district and district, handicaps certain trades in the one as compared with similar trades in the other district, whilst inequality or uncertainty of allotment is unfair as between individuals trading in the same district, for "it must always be remembered that the real end and object for the assessment of property is not to determine as a mere speculative question the rent at which it might let from year to year, but to bring the particular property down to a common basis, so that the burden of the poor-rates may be equally borne by the occupiers within the parish. This being so, it does not seem unreasonable, when any difficulty arises in ascertaining how a particular property or class of property is assessed, that reference should be made to the rules that prevail in the valuation of ordinary classes of property in the parish. Special properties may require special rules, but where there is no such necessity the occupier of property has a right to have applied to his occupation the principles which determine the rateability of other property." *

Assessment should be on common basis.

That machinery *per se* is not rateable is generally admitted; indeed, any other conclusion would be inconsistent with the Act of 1840 by which personal property was declared not to be rateable. The question is as to how far in factories or works, the machinery is to be taken into account, as enhancing the rateable value of the hereditaments. The law on this point, if law there can be said to be, is to be found in the judge's decisions in cases of appeals against assessments, and these decisions have so widely differed that the author of the legal text-book already referred to admits that it is impossible to reconcile them, whilst many factory occupiers believe that certainty and equality in assessment are only to be obtained by legislative definition of what machinery is to be considered in the assessment.

Chattels not rateable.

Legal decisions.

machinery from the assessment of the works, and to rate all engines at a uniform rate of £4 per horse-power. And he adds, "To rate all engines on a uniform rate of £4 per horse-power, irrespective of whether they are common engines with egg-end boilers and a few feet of shafting, or high-class engines with tubular boilers, super-heaters, and many yards of shafting, is clearly as unfair and unequal as it would be to rate all agricultural lands in the Union at a uniform rate of £2 per acre, irrespective of whether the land is worth £1 or £5 per acre."

* "A Practical Treatise on the Law of Rating," by E. J. Castle, K.C. London: Stevens.

The cases referred to extend over the last hundred years, but only four of these need now be taken as landmarks of the subject.

The Phoenix Gas Company case. In 1866 the assessment of the Phoenix Gas Company was appealed against, but it was held that the steam-engines, boilers, gasholders, retorts, and purifiers at the works and the mains in the public streets added to the permanent value of the freehold, and as such were rightly considered

in the assessment. In the following year, however, in **The Halstead silk factory case.** the case of a silk factory at Halstead it was held that looms and other machines merely screwed to the floor came under the category of movable fixtures, and were not to be considered in the assessment.* In 1877-8, however, the late Lord Chief Justice Cockburn, in the case of "Laing and the

The Laing case. Overseers of Bishopswearmouth," expressed some doubt as to the decision in the Halstead case, and with reference to the case then before the Court, said: "This

strikes me as being a case the principle involved in which is of very considerable importance, in which I should hope there would be a final and binding authority upon the subject, and in which we may have to consider the effect of these cases (the cases quoted in the argument), which perhaps may prove to be somewhat in conflict with one another." In this instance it was held

An important decision. that the lathes and machines, for planing, drilling, punching, and riveting were properly included in the assessment, as such machinery, though some of it might be capable of being removed without injury to itself or the freehold, was "essentially necessary to the shipbuilding business to which the appellants' premises are devoted, and must be taken to be intended to remain permanently attached to them so long as these premises are applied to that present purpose."

In 1886 the Court of Appeal gave a decision which confirms and

* Trade fixtures generally (using the term as inclusive of both removable and permanent fixtures) are said to be both theoretically and legally rateable, but the practice of exempting removable fixtures has become almost universal. "The law is that they are part of the premises, and pass under a mortgage, and a tenant is allowed to remove them during his term, not in the same way as he may his carpets, but only because the Courts were induced to relax the strictness of the old rules of law in order that the commercial interests of the country might be enhanced by the encouragement given to tenants to employ their capital in making improvements for carrying on trade, from the certainty of having the benefit of the expenditure secured to them to the end of their term."—"A Practical Treatise on the Law of Rating." E. J. Castle, K.C. London: Stevens.

extends that given in the case of *Laing v. the Overseers of Bishopswearmouth*. This decision has been given in a case stated for the opinion of the Court by the Northumberland Quarter Sessions, who held that the Tyne Boiler Works Company had been rightly assessed to the relief of the poor, the rateable value of their premises being arrived at by ascertaining the gross estimated rental which a tenant from year to year might reasonably be expected to be willing to give for the use of them (inclusive of the machinery and plant), and by making the statutory deductions from such rental. The premises were occupied under a lease from the Corporation of Newcastle upon-Tyne, and they were described as being rendered suitable for boiler-making by their proximity to the Tyne and as containing machinery for boiler-making, part of such machinery being affixed to the soil, but part, such as a hydraulic riveting machine, two hand-power travelling cranes, and shear legs with engine and boiler, was not attached either to the soil or the building but rested by their own weight. There was a boiler set on a brick seating outside the main building, and the main engine was fixed by iron screw bolts to masonry foundations, in which a well was constructed for the fly-wheel, and other machinery was affixed by bolts or brackets to the walls, or to a foundation of stone or cement. As to the machinery that was not affixed to the soil or building, the hydraulic riveting machine rested upon cement or stone foundations, the travelling cranes ran along the whole length of the main building on rails laid on balks of timber resting upon brackets, and the shear legs were placed on the edge of a timber jetty on the river. The main shafting ran along the entire length of the main building, and all the machines were worked by belts from the main shafting. All the machines and plant belonged to the Company, and were arranged and adapted for use upon the premises for the manufacturing and setting up of boilers, but there was no intention of permanently annexing them to the soil or premises. Each of the machines was separate, and was from time to time removed for repairs or otherwise without injury to themselves or structural damage to the premises, the object of the attachment described being to steady the machines when working.

The Divisional Court having confirmed the order of the Northumberland Quarter Sessions, the Company appealed, with the result that the judgment of the Queen's Bench Division was affirmed. The Master of the Rolls, in giving judgment, reviewed

the various prior decisions on the subject, and stated that the rule might be laid down thus :—Things which were on the premises to be rated, which were there for the purpose of making and which made the premises fit as premises for the particular purpose for which they were used, ought to be taken into consideration as enhancing the rateable value of those premises. Anything that would come under this category would pass by demise as between landlord and tenant, and would as such be rightly considered in the assessment.*

In 1889 the Chard (Somersetshire) Assessment Committee in assessing lace factories took into consideration the lace-making machinery on the premises. The assessment was appealed against, and the amount thereof was considerably reduced at the Somersetshire Quarter Sessions : the Assessment Committee was ordered to pay the costs. Against the reduced assessment appeals were carried to the Queen's Bench Division and the Court of Appeal, and in these appeals the original question as to the rating of machinery *per se* appears to have become ignored, for the Chard Assessment Committee, after a decision in their favour in the Court of Appeal, suggested a compromise by which, each party paying their own costs, the sum in dispute should be equally divided. The manufacturers accepted the compromise offered, as they were advised that the reduced assessment would represent the rateable value.

In similar circumstances the Gloucester and Sunderland Assessment Committees have, without there being an appeal to the Queen's Bench Division or Court of Appeal, acted on the lines of compromise carried out by the Chard Committee.

The case of *Crockett and Jones v. the Northampton Union*, which was before the High Court in 1902, referred to very small

* The case is thus noted in the *Law Times* of December 4, 1886 :—"Poor Rate—Rating of Premises used for a particular purpose—Chattels on the Premises—Boiler Works—Machinery and Plant. In assessing premises to the poor rate, the question whether chattels on the premises are affixed to the soil or not is not an absolute test in determining whether or not they are to be taken into account as enhancing the value of the premises. But things which are on the premises to be rated, and which are there for the purpose of making them, and which do make them, fit as premises for the purpose for which they are used, ought to be taken into account for rating purposes. Therefore the machinery and plant of a boiler works which (whether affixed to the soil or not) is essentially necessary to the carrying on of the business to which the premises are devoted, and which is intended to remain upon the premises so long as they are used for the same purpose, ought to be taken into account as enhancing the value of the premises."

machines used in the manufacture of boots and shoes. The premises in question consisted of a boot manufactory fitted with two classes of machinery, the first class consisting of gas engine, boilers, shafting, etc., and which were admittedly part of the freehold and which both sides agreed were to be taken into consideration in arriving at an assessment of the premises; the second class is what is usually known as Tenants' Machinery, consisting chiefly of small sewing and cutting machines necessary for the manufacture of boots and shoes, none of the machinery being so fixed as to be part of the freehold. Some of the machines did not need to be bolted to the flooring, but were steadied by putting the footplates under wedges. They were driven by power from overhead shafting and pulleys. This latter class the Union Authorities had included in their assessment of the premises, whilst the appellants contended that such machines were "chattels." The High Court held that the Assessment Committee were right in taking the second class machinery into consideration in fixing the assessment, and that the rateable value was to be based upon the suitability of the premises to receive the second class machinery, and on the fact that such machinery was on the premises.

Throughout the judgments in the Bishopswearmouth, Tyne and Northampton cases, there seems to run an assumption that a hypothetical tenant might give a higher rent for premises **The decisions criticised.** by reason of his having the opportunity of taking the machinery contained therein. This is probably true as regards motive power and the machinery common to most trades, which is generally attached permanently to the premises, and these, on account of being so furnished, let at higher rentals. But specially designed machinery can only increase the probable rental, and therefore the assessment, if the premises are let to an incoming tenant carrying on the same trade as the outgoing tenant and by means of similar mechanical appliances, and in that case part of the increased rental would be due to the opportunity of entering furnished premises, and part to the opportunity of acquiring by purchase from the outgoing tenant some of the machinery which he might otherwise remove.*

The decisions referred to will probably so intensify the confusion

* "Trade fixtures attached to the soil are to be taken as landlord's property, subject only to the special privilege granted to the tenant who has put them up of removing them during his tenure."—"A Practical Treatise on the Law of Rating," by E. J. Castle, K.C.

in the minds of the various rating authorities with regard to what is and what is not to be considered as assessable, as to lead to useful controversy with regard to what should and what should not be assessable, and eventually to legislative enactment on the subject.

In view of these varying decisions or interpretations of the law, and the uncertainty and want of uniformity in assessments, a Bill to amend the law relating to the Rating of Machinery was introduced into the House of Commons in 1885, but was not proceeded with until 1893, when, owing to the exertions of the National Society for the Exemption of Machinery from Rating, a somewhat similar Bill was introduced into Parliament to amend the law. This Bill and similar Bills have been carried on second reading in the House of Commons in the various sessions in which they have been introduced. The Royal Commission on Taxation considered the subject and reported in 1901. The Commissioners favoured an alteration of the law in the sense proposed by the Bill, stating, "We therefore recommend that in estimating the rateable value of any hereditament occupied for trade, business, or manufacturing purposes, there shall be excluded from the assessment any increased value arising from machines, tools, or appliances which are not fixed, or are only so fixed that they can be removed from their places without necessitating the removal of any part of the hereditament, but the value of any machinery or plant used on the hereditament for producing or transmitting first motive power, or for heating or lighting a hereditament should be included."

On December 18, 1905, the House of Lords gave judgment in the appeal case of Kirby, and the Assessment Committee of Hunslet Union and others, and dismissed the ratepayers appeal on the ground, mainly it would seem, that the lower Courts had for fifty years passed successive judgments to the same effect. This was the first time the question had been raised in the House of Lords. In effect it was in this case held by the final Court, that in assessing the value of premises used as engineering works, the value of user of the machinery, which is on the premises for the purpose of making the premises fit, as such, for engineering works, must be taken into account as enhancing the value of the premises, even if such machinery is not fixed to the freehold by physical attachment so as to form part thereof.

The work of educating public and parliamentary opinion on this matter has been ably taken up by the Machinery Users

Association who, in the session of Parliament in 1906, introduced a Bill applicable to England and Wales by which it was provided "From and after the passing of this Act in estimating for the purpose of any valuation list, or poor or other local rate, the gross estimated rental or rateable value of any hereditament occupied for any trade, business, or manufacturing purposes, any increased value arising from machines, tools, or appliances which are not fixed or are only so fixed that they can be removed from their place without necessitating the removal of any part of the said hereditament shall be excluded.

"Provided that the gross estimated rental of any such hereditament shall be estimated at not less than the sum at which it might reasonably be expected to let for the purpose for which it is used on a tenancy from year to year void of the machines, tools, and appliances which it might reasonably be expected would be supplied by the tenant, if the tenant paid all the usual tenants' rates and taxes and if the landlord undertook to bear the cost of the repairs and insurance and the other expenses (if any) necessary to maintain the said hereditament in a state to command such rent.

"Provided also that the terms machines, tools, and appliances for the purposes of this Act shall not apply to any machinery, machine, or plant used in or on the hereditament for producing or transmitting first motive power, or for heating or lighting the said hereditament."

On the promise of the Government to introduce a Valuation Bill of their own the Bill of the Machinery Users Association was not re-introduced in the following session, and in the opinion of the Association no favourable opportunity for the introduction of a Bill of a similar proposal presented itself till 1920. In the preamble of the Bill then introduced, it was declared that doubts have arisen as to how far machinery is to be included or taken into consideration in estimating the value for purposes of local rates of hereditaments occupied for any trade, business, or manufacture, that the practice of estimating such value is not uniform throughout England and Wales, and that the law relating thereto in England and Wales differs from that in force in Scotland, and that it is desirable to secure uniformity, it should be enacted that—(1) In the construction of any enactment relating to the gross estimated rental, gross value, annual value, rateable value, or assessable value of any hereditament for the purpose of any local rate, or of the basis or standard thereof,

or of any valuation list, or of any water rate or water rent, the word hereditament shall be deemed to include such machinery only as is fixed or attached to the hereditament. (2) In the case of any hereditament occupied for any trade, business, or manufacture, the expression "fixed or attached" in the preceding section shall be construed as applying to all machinery, machines, or plant, in or on the hereditament, for producing or transmitting first motive power or for heating or lighting such hereditament, but save as herein provided shall not apply to machine tools or appliances which are only so fixed that they can be removed from their place without necessitating the removal of any part of the hereditament.

Pending settlement of the question it may be serviceable to enumerate some of the points to be considered before agreeing to or dissenting from assessments.

The basis of assessment on factories rented from year to year is naturally the actual net rental value. Questions only arise where the occupier's interest is that of a freeholder or a lessee for a term of years, and where machinery has been erected by the occupier *quâ* occupier. In either case the basis of assessment would be the gross estimated rental which in a particular district, under ordinary circumstances, a tenant from year to year might reasonably be expected to give for the use of the premises inclusive of the machinery and plant, with the deduction on account of maintenance, repairs, fire insurance, and any charges which in a term of years would have to be met before profit could be reckoned.* In the case of factories occupied by the owner it should be remembered that the assessment is made on him as an occupier, and that he should discriminate between his dual interests. Whilst calculations on the basis of the capital sunk in the building and on his plant, and the interest thereon, are aids in checking the estimated rental that would be receivable, they cannot be considered as final, or as yielding a basis of assessment, owing to numerous accidental circumstances, such as the increase or decrease in the value of ground rents, and of variation of cost in the construction of new, or structural alteration in, old factories.

The same basis of assessment is often applied to the rating

* This deduction should, in our opinion, include a provision for obsolescence. All machinery is of a changeable nature, and provision has constantly to be made for its going out of fashion.

of workshops, using that term as distinctive of places where production is not made for profit, but where production or repairs are effected for the sole use and benefit of the occupiers. In this category fall the shops of railway, gas, tram, water, and similar undertakings, as also national and municipal workshops.

The basis of assessment on workshops.

Aid in checking that portion of the assessment which may be said to be on account of machinery, is derivable from a Machinery Ledger, if such be kept (see Chapter VII.). The value of the machinery that would pass with the freehold would be ascertainable from it.

The statute law in Scotland as regards the rating of machinery differs from that of England. In the former country, the main statutes are the Lands Valuation Act of 1854, which under the term "lands and heritages" includes "all machinery fixed or attached to any lands or heritages" as liable to assessment, and the Valuation Act of 1902. In the case of the North British Railway Co. (1887, 25 Sc. L. Rep. 4), Lord Fraser held that machinery that could be "detached without destruction to itself or injury and destruction to the building," was not attached and was not assessable.

In 1894, Lord Wellwood held, in the case of Cowan & Sons, Limited, that such machinery was assessable provided it could be shown to have been attached to the premises in order to be permanently or quasi-permanently used in that position, and that the buildings had been altered and specially adapted to the use of the machinery, and would require to be reconstructed or altered if the machinery were removed, unless replaced by machinery of precisely the same size or shape. This view was upheld by the Lands Valuation Appeal Court in March, 1902, when, in the case of James Carmichael & Co., Limited, it was held that machines in an engineering foundry attached by bolts to specially prepared foundations were assessable. Under the Act of 1902, machinery or plant for "producing or transmitting first motive power" are rateable. The ambiguity of the phrase, "first motive power," has led to several appeals against assessments, but the results of such appeals have not on the whole been satisfactory to manufacturers.

The practice by which surveyors arrive at the deduction to be made from the gross to produce the rateable value, varies in different districts, and with different surveyors. It is of considerable importance to the occupiers of factories, however, to see that they are obtaining the full abatement to which they are entitled.

In London, by the Statute of 1869, the maximum deduction is one-third, and this, in cases where the gross value of the machinery is small relatively to the value of the lands and buildings, may lead, where varying rates of deduction are allowed on land, buildings, and machinery respectively, to the anomaly of a property containing machinery being assessed at a lower rateable value than a similar property not containing machinery.

The London Assessment Conference of 1904, conscious of the anomaly thus produced, adopted the suggestion made by Mr. Harper, the statistical officer of the London County Council, that as a working rule the difference between the gross and rateable value should be computed as follows :—

1. Arrive at the gross value of the lands and buildings in the usual way, and deduct therefrom the usual proportion to arrive at the rateable value.

2. Arrive at the gross value of the machinery by taking a percentage of ten per cent. on the capital value, and deduct therefrom a portion of two-fifths to arrive at the rateable value.

3. The total of these two deductions will represent a fair amount to be deducted from the gross value to arrive at the rateable value of the hereditaments as a whole.

In January, 1914, the Machinery Users Association (Incorporated) established a rating and valuation department to render advice and assistance in connection with rating.

APPENDIX C.

TABLE FOR DETERMINING AMORTIZATION OF LEASES, &c.
(For examples, see page 250).

| Years. | Years Pur. 3 per Cent. | | Years Pur. 4 per Cent. | | Years Pur. 5 per Cent. | | Years Pur. 6 per Cent. | | Years. |
|--------|---------------------------|--------|---------------------------|--------|---------------------------|--------|---------------------------|--------|--------|
| 1 | .489 | 1 | .485 | 1 | .482 | 1 | .479 | 1 | 1 |
| 1 1/2 | .971 | 1 1/2 | .962 | 1 1/2 | .952 | 1 1/2 | .943 | 1 1/2 | 1 1/2 |
| 2 | 1.446 | 2 | 1.438 | 2 | 1.411 | 2 | 1.395 | 2 | 2 |
| 2 1/2 | 1.913 | 2 1/4 | 1.886 | 2 1/4 | 1.859 | 2 1/4 | 1.833 | 2 1/4 | 2 1/2 |
| 3 | 2.374 | 2 3/4 | 2.335 | 2 3/4 | 2.297 | 2 3/4 | 2.259 | 2 3/4 | 3 |
| 3 1/2 | 2.829 | 3 | 2.775 | 3 | 2.723 | 3 | 2.673 | 3 | 3 1/2 |
| 4 | 3.276 | 3 1/4 | 3.207 | 3 1/4 | 3.140 | 3 1/4 | 3.075 | 3 1/4 | 4 |
| 4 1/2 | 3.717 | 3 1/2 | 3.630 | 3 1/2 | 3.546 | 3 1/2 | 3.465 | 3 1/2 | 4 1/2 |
| 5 | 4.152 | 4 | 4.045 | 4 | 3.942 | 4 | 3.844 | 4 | 5 |
| 5 1/2 | 4.580 | 4 1/2 | 4.452 | 4 1/2 | 4.329 | 4 1/2 | 4.212 | 4 1/2 | 5 1/2 |
| 6 | 5.002 | 5 | 4.851 | 5 | 4.707 | 5 | 4.570 | 5 | 6 |
| 6 1/2 | 5.417 | 5 1/2 | 5.242 | 5 1/2 | 5.076 | 5 1/2 | 4.917 | 5 1/2 | 6 1/2 |
| 7 | 5.827 | 6 | 5.626 | 6 | 5.435 | 6 | 5.255 | 6 | 7 |
| 7 1/2 | 6.230 | 6 1/2 | 6.002 | 6 1/2 | 5.786 | 6 1/2 | 5.582 | 6 1/2 | 7 1/2 |
| 8 | 6.628 | 7 | 6.371 | 7 | 6.129 | 7 | 5.901 | 7 | 8 |
| 8 1/2 | 7.020 | 7 1/2 | 6.733 | 7 1/2 | 6.463 | 7 1/2 | 6.210 | 7 1/2 | 8 1/2 |
| 9 | 7.406 | 8 | 7.087 | 8 | 6.789 | 8 | 6.510 | 8 | 9 |
| 9 1/2 | 7.786 | 8 1/2 | 7.435 | 8 1/2 | 7.108 | 8 1/2 | 6.802 | 8 1/2 | 9 1/2 |
| 10 | 8.161 | 9 | 7.776 | 9 | 7.419 | 9 | 7.085 | 9 | 10 |
| 10 1/2 | 8.530 | 9 1/2 | 8.111 | 9 1/2 | 7.722 | 9 1/2 | 7.360 | 9 1/2 | 10 1/2 |
| 11 | 8.894 | 10 | 8.439 | 10 | 8.018 | 10 | 7.627 | 10 | 11 |
| 11 1/2 | 9.253 | 10 1/2 | 8.760 | 10 1/2 | 8.306 | 10 1/2 | 7.887 | 10 1/2 | 11 1/2 |
| 12 | 9.606 | 11 | 9.076 | 11 | 8.588 | 11 | 8.139 | 11 | 12 |
| 12 1/2 | 9.954 | 11 1/2 | 9.385 | 11 1/2 | 8.863 | 11 1/2 | 8.384 | 11 1/2 | 12 1/2 |
| 13 | 10.297 | 12 | 9.688 | 12 | 9.132 | 12 | 8.622 | 12 | 13 |
| 13 1/2 | 10.635 | 12 1/2 | 9.986 | 12 1/2 | 9.394 | 12 1/2 | 8.853 | 12 1/2 | 13 1/2 |
| 14 | 10.968 | 13 | 10.277 | 13 | 9.649 | 13 | 9.077 | 13 | 14 |
| 14 1/2 | 11.296 | 13 1/2 | 10.563 | 13 1/2 | 9.899 | 13 1/2 | 9.295 | 13 1/2 | 14 1/2 |
| 15 | 11.619 | 14 | 10.843 | 14 | 10.142 | 14 | 9.507 | 14 | 15 |
| 15 1/2 | 11.938 | 14 1/2 | 11.118 | 14 1/2 | 10.380 | 14 1/2 | 9.712 | 14 1/2 | 15 1/2 |
| 16 | 12.252 | 15 | 11.388 | 15 | 10.612 | 15 | 9.912 | 15 | 16 |
| 16 1/2 | 12.561 | 15 1/2 | 11.652 | 15 1/2 | 10.838 | 15 1/2 | 10.106 | 15 1/2 | 16 1/2 |
| 17 | 12.866 | 16 | 11.911 | 16 | 11.059 | 16 | 10.294 | 16 | 17 |
| 17 1/2 | 13.166 | 16 1/2 | 12.166 | 16 1/2 | 11.274 | 16 1/2 | 10.477 | 16 1/2 | 17 1/2 |
| 18 | 13.462 | 17 | 12.415 | 17 | 11.484 | 17 | 10.655 | 17 | 18 |
| 18 1/2 | 13.754 | 17 1/2 | 12.659 | 17 1/2 | 11.690 | 17 1/2 | 10.828 | 17 1/2 | 18 1/2 |
| 19 | 14.041 | 18 | 12.899 | 18 | 11.890 | 18 | 10.995 | 18 | 19 |
| 19 1/2 | 14.324 | 18 1/2 | 13.134 | 18 1/2 | 12.085 | 18 1/2 | 11.158 | 18 1/2 | 19 1/2 |
| 20 | 14.603 | 19 | 13.364 | 19 | 12.276 | 19 | 11.316 | 19 | 20 |
| 20 1/2 | 14.877 | 19 1/2 | 13.590 | 19 1/2 | 12.462 | 19 1/2 | 11.470 | 19 1/2 | 20 1/2 |

DETERMINING AMORTIZATION OF LEASES, ETC. 245

TABLE FOR DETERMINING THE AMORTIZATION OF LEASES, &c.
(For examples, see page 250.)

| Years. | Years Pur. 7 per Cent. | | Years Pur. 8 per Cent. | | Years Pur. 9 per Cent. | | Years Pur. 10 per Cent. | | Years. |
|--------|---------------------------|--------|---------------------------|--------|---------------------------|--------|----------------------------|--------|--------|
| 1 | 475 | 1/2 | 472 | 1/2 | 469 | 1/2 | 465 | 1/2 | 1 |
| 1 1/2 | 935 | 1 | 926 | 1 | 917 | 1 | 909 | 1 | 1 1/2 |
| 2 | 1379 | 1 1/2 | 1363 | 1 1/2 | 1347 | 1 1/2 | 1332 | 1 1/2 | 2 |
| 2 1/2 | 1808 | 2 | 1783 | 2 | 1759 | 2 | 1736 | 2 | 2 1/2 |
| 3 | 2223 | 2 1/2 | 2188 | 2 1/2 | 2154 | 2 1/2 | 2120 | 2 1/2 | 3 |
| 3 1/2 | 2624 | 3 | 2577 | 3 | 2531 | 3 | 2487 | 3 | 3 1/2 |
| 4 | 3012 | 3 1/2 | 2952 | 3 1/2 | 2893 | 3 1/2 | 2836 | 3 1/2 | 4 |
| 4 1/2 | 3387 | 4 | 3312 | 4 | 3240 | 4 | 3170 | 4 | 4 1/2 |
| 5 | 3750 | 4 1/2 | 3659 | 4 1/2 | 3572 | 4 1/2 | 3488 | 4 1/2 | 5 |
| 5 1/2 | 4100 | 5 | 3993 | 5 | 3890 | 5 | 3791 | 5 | 5 1/2 |
| 6 | 4439 | 5 1/2 | 4314 | 5 1/2 | 4194 | 5 1/2 | 4080 | 5 1/2 | 6 |
| 6 1/2 | 4767 | 6 | 4623 | 6 | 4486 | 6 | 4355 | 6 | 6 1/2 |
| 7 | 5083 | 6 1/2 | 4920 | 6 1/2 | 4765 | 6 1/2 | 4618 | 6 1/2 | 7 |
| 7 1/2 | 5389 | 7 | 5206 | 7 | 5033 | 7 | 4868 | 7 | 7 1/2 |
| 8 | 5685 | 7 1/2 | 5482 | 7 1/2 | 5289 | 7 1/2 | 5107 | 7 1/2 | 8 |
| 8 1/2 | 5971 | 8 | 5747 | 8 | 5535 | 8 | 5335 | 8 | 8 1/2 |
| 9 | 6248 | 8 1/2 | 6002 | 8 1/2 | 5770 | 8 1/2 | 5552 | 8 1/2 | 9 |
| 9 1/2 | 6515 | 9 | 6247 | 9 | 5995 | 9 | 5759 | 9 | 9 1/2 |
| 10 | 6774 | 9 1/2 | 6483 | 9 1/2 | 6211 | 9 1/2 | 5956 | 9 1/2 | 10 |
| 10 1/2 | 7024 | 10 | 6710 | 10 | 6418 | 10 | 6145 | 10 | 10 1/2 |
| 11 | 7265 | 10 1/2 | 6929 | 10 1/2 | 6616 | 10 1/2 | 6324 | 10 1/2 | 11 |
| 11 1/2 | 7499 | 11 | 7139 | 11 | 6805 | 11 | 6495 | 11 | 11 1/2 |
| 12 | 7724 | 11 1/2 | 7341 | 11 1/2 | 6987 | 11 1/2 | 6658 | 11 1/2 | 12 |
| 12 1/2 | 7943 | 12 | 7536 | 12 | 7161 | 12 | 6814 | 12 | 12 1/2 |
| 13 | 8154 | 12 1/2 | 7723 | 12 1/2 | 7327 | 12 1/2 | 6962 | 12 1/2 | 13 |
| 13 1/2 | 8358 | 13 | 7904 | 13 | 7487 | 13 | 7103 | 13 | 13 1/2 |
| 14 | 8555 | 13 1/2 | 8077 | 13 1/2 | 7640 | 13 1/2 | 7238 | 13 1/2 | 14 |
| 14 1/2 | 8745 | 14 | 8244 | 14 | 7786 | 14 | 7367 | 14 | 14 1/2 |
| 15 | 8930 | 14 1/2 | 8405 | 14 1/2 | 7926 | 14 1/2 | 7489 | 14 1/2 | 15 |
| 15 1/2 | 9108 | 15 | 8559 | 15 | 8061 | 15 | 7606 | 15 | 15 1/2 |
| 16 | 9280 | 15 1/2 | 8708 | 15 1/2 | 8189 | 15 1/2 | 7717 | 15 1/2 | 16 |
| 16 1/2 | 9447 | 16 | 8851 | 16 | 8313 | 16 | 7824 | 16 | 16 1/2 |
| 17 | 9608 | 16 1/2 | 8989 | 16 1/2 | 8431 | 16 1/2 | 7925 | 16 1/2 | 17 |
| 17 1/2 | 9763 | 17 | 9122 | 17 | 8544 | 17 | 8022 | 17 | 17 1/2 |
| 18 | 9914 | 17 1/2 | 9249 | 17 1/2 | 8652 | 17 1/2 | 8114 | 17 1/2 | 18 |
| 18 1/2 | 10059 | 18 | 9372 | 18 | 8756 | 18 | 8201 | 18 | 18 1/2 |
| 19 | 10200 | 18 1/2 | 9490 | 18 1/2 | 8855 | 18 1/2 | 8285 | 18 1/2 | 19 |
| 19 1/2 | 10336 | 19 | 9604 | 19 | 8950 | 19 | 8365 | 19 | 19 1/2 |
| 20 | 10467 | 19 1/2 | 9713 | 19 1/2 | 9041 | 19 1/2 | 8441 | 19 1/2 | 20 |
| | 10594 | 20 | 9818 | 20 | 9129 | 20 | 8514 | 20 | |

TABLE FOR DETERMINING THE AMORTIZATION OF LEASES, &c.
Continued.

| Years. | Years Pur. 3 per Cent. | | Years Pur. 4 per Cent. | | Years Pur. 5 per Cent. | | Years Pur. 6 per Cent. | | Years. |
|--------|---------------------------|-----|---------------------------|-----|---------------------------|-----|---------------------------|-----|--------|
| 20½ | 15·148 | 15¼ | 13·812 | 13¾ | 12·644 | 12¾ | 11·619 | 11½ | 20½ |
| 21 | 15·415 | 15½ | 14·029 | 14 | 12·821 | 12¾ | 11·764 | 11¾ | 21 |
| 21½ | 15·678 | 15¾ | 14·242 | 14½ | 12·994 | 13 | 11·905 | 12 | 21½ |
| 22 | 15·937 | 16 | 14·451 | 14¾ | 13·163 | 13¼ | 12·042 | 12 | 22 |
| 22½ | 16·192 | 16¼ | 14·656 | 14¾ | 13·328 | 13¼ | 12·174 | 12¼ | 22½ |
| 23 | 16·444 | 16½ | 14·857 | 14¾ | 13·489 | 13½ | 12·303 | 12½ | 23 |
| 23½ | 16·691 | 16¾ | 15·054 | 15 | 13·645 | 13¾ | 12·429 | 12¾ | 23½ |
| 24 | 16·936 | 17 | 15·247 | 15½ | 13·799 | 13¾ | 12·550 | 12¾ | 24 |
| 24½ | 17·176 | 17¼ | 15·436 | 15¾ | 13·948 | 14 | 12·669 | 12¾ | 24½ |
| 25 | 17·413 | 17½ | 15·622 | 15¾ | 14·094 | 14 | 12·783 | 12¾ | 25 |
| 25½ | 17·647 | 17¾ | 15·804 | 15¾ | 14·236 | 14¼ | 12·895 | 13 | 25½ |
| 26 | 17·877 | 18 | 15·983 | 16 | 14·375 | 14½ | 13·003 | 13 | 26 |
| 26½ | 18·104 | 18 | 16·158 | 16¼ | 14·511 | 14½ | 13·108 | 13 | 26½ |
| 27 | 18·327 | 18½ | 16·330 | 16¼ | 14·643 | 14½ | 13·211 | 13½ | 27 |
| 27½ | 18·547 | 18½ | 16·498 | 16½ | 14·772 | 14½ | 13·310 | 13½ | 27½ |
| 28 | 18·764 | 18¾ | 16·663 | 16½ | 14·898 | 15 | 13·406 | 13½ | 28 |
| 28½ | 18·978 | 19 | 16·825 | 16¾ | 15·021 | 15 | 13·500 | 13½ | 28½ |
| 29 | 19·188 | 19½ | 16·984 | 17 | 15·141 | 15¼ | 13·591 | 13½ | 29 |
| 29½ | 19·396 | 19¾ | 17·139 | 17¼ | 15·258 | 15¼ | 13·679 | 13½ | 29½ |
| 30 | 19·600 | 19¾ | 17·292 | 17¼ | 15·372 | 15¼ | 13·765 | 13½ | 30 |
| 30½ | 19·802 | 19¾ | 17·442 | 17½ | 15·484 | 15½ | 13·848 | 13¾ | 30½ |
| 31 | 20·000 | 20 | 17·588 | 17½ | 15·593 | 15½ | 13·929 | 14 | 31 |
| 31½ | 20·196 | 20½ | 17·732 | 17¾ | 15·699 | 15½ | 14·008 | 14 | 31½ |
| 32 | 20·389 | 20½ | 17·874 | 17¾ | 15·803 | 15½ | 14·084 | 14 | 32 |
| 32½ | 20·579 | 20¾ | 18·012 | 18 | 15·904 | 16 | 14·158 | 14¼ | 32½ |
| 33 | 20·766 | 20¾ | 18·148 | 18¼ | 16·003 | 16 | 14·230 | 14¼ | 33 |
| 33½ | 20·950 | 21 | 18·281 | 18¼ | 16·099 | 16 | 14·300 | 14¼ | 33½ |
| 34 | 21·132 | 21¼ | 18·411 | 18½ | 16·193 | 16¼ | 14·368 | 14¼ | 34 |
| 34½ | 21·311 | 21½ | 18·539 | 18½ | 16·285 | 16¼ | 14·434 | 14½ | 34½ |
| 35 | 21·487 | 21½ | 18·665 | 18¾ | 16·374 | 16¼ | 14·498 | 14½ | 35 |
| 35½ | 21·661 | 21¾ | 18·788 | 18¾ | 16·462 | 16½ | 14·561 | 14½ | 35½ |
| 36 | 21·832 | 21¾ | 18·908 | 19 | 16·547 | 16½ | 14·621 | 14½ | 36 |
| 36½ | 22·001 | 22 | 19·027 | 19 | 16·630 | 16½ | 14·680 | 14½ | 36½ |
| 37 | 22·167 | 22¼ | 19·143 | 19¼ | 16·711 | 16½ | 14·737 | 14½ | 37 |
| 37½ | 22·331 | 22¼ | 19·256 | 19¼ | 16·791 | 16½ | 14·792 | 14½ | 37½ |
| 38 | 22·492 | 22½ | 19·368 | 19½ | 16·868 | 16½ | 14·846 | 14½ | 38 |
| 38½ | 22·652 | 22½ | 19·477 | 19½ | 16·943 | 17 | 14·898 | 15 | 38½ |
| 39 | 22·808 | 22½ | 19·584 | 19½ | 17·017 | 17 | 14·949 | 15 | 39 |
| 39½ | 22·963 | 23 | 19·690 | 19¾ | 17·089 | 17 | 14·998 | 15 | 39½ |
| 40 | 23·115 | 23 | 19·793 | 19¾ | 17·159 | 17¼ | 15·046 | 15 | 40 |

DETERMINING AMORTIZATION OF LEASES, ETC. 247

TABLE FOR DETERMINING THE AMORTIZATION OF LEASES, &c.
Continued.

| Years. | Years Pur. 7 per Cent. | | Years Pur. 8 per Cent. | | Years Pur. 9 per Cent. | | Years Pur. 10 per Cent. | | Years. |
|--------|---------------------------|--------------------------------|---------------------------|--------------------------------|---------------------------|-------------------------------|----------------------------|----|--------|
| 20½ | 10·717 | 10 ³ / ₄ | 9·919 | 10 | 9·212 | 9 ¹ / ₄ | 8·583 | 8½ | 20½ |
| 21 | 10·836 | 10 ³ / ₄ | 10·017 | 10 | 9·292 | 9 ¹ / ₄ | 8·649 | 8½ | 21 |
| 21½ | 10·950 | 11 | 10·111 | 10 | 9·369 | 9½ | 8·712 | 8½ | 21½ |
| 22 | 11·061 | 11 | 10·201 | 10½ | 9·442 | 9½ | 8·772 | 8½ | 22 |
| 22½ | 11·168 | 11 ¹ / ₄ | 10·288 | 10½ | 9·513 | 9½ | 8·829 | 8½ | 22½ |
| 23 | 11·272 | 11 ¹ / ₄ | 10·371 | 10½ | 9·580 | 9½ | 8·883 | 9 | 23 |
| 23½ | 11·372 | 11 ¹ / ₄ | 10·451 | 10½ | 9·645 | 9½ | 8·935 | 9 | 23½ |
| 24 | 11·469 | 11 | 10·529 | 10½ | 9·707 | 9½ | 8·985 | 9 | 24 |
| 24½ | 11·563 | 11 | 10·603 | 10½ | 9·766 | 9½ | 9·032 | 9 | 24½ |
| 25 | 11·654 | 11 | 10·675 | 10½ | 9·823 | 9½ | 9·077 | 9 | 25 |
| 25½ | 11·741 | 11 ³ / ₄ | 10·744 | 10 ³ / ₄ | 9·877 | 10 | 9·120 | 9 | 25½ |
| 26 | 11·826 | 11 ³ / ₄ | 10·810 | 10 ³ / ₄ | 9·929 | 10 | 9·161 | 9½ | 26 |
| 26½ | 11·908 | 12 | 10·874 | 10 ³ / ₄ | 9·979 | 10 | 9·200 | 9½ | 26½ |
| 27 | 11·987 | 12 | 10·935 | 11 | 10·027 | 10 | 9·237 | 9½ | 27 |
| 27½ | 12·063 | 12 | 10·994 | 11 | 10·072 | 10 | 9·273 | 9½ | 27½ |
| 28 | 12·137 | 12 ¹ / ₄ | 11·051 | 11 | 10·116 | 10 | 9·307 | 9½ | 28 |
| 28½ | 12·209 | 12 ¹ / ₄ | 11·106 | 11 | 10·158 | 10½ | 9·339 | 9½ | 28½ |
| 29 | 12·278 | 12 ¹ / ₄ | 11·158 | 11½ | 10·198 | 10½ | 9·370 | 9½ | 29 |
| 29½ | 12·344 | 12 ¹ / ₄ | 11·209 | 11½ | 10·237 | 10½ | 9·399 | 9½ | 29½ |
| 30 | 12·409 | 12½ | 11·258 | 11½ | 10·274 | 10½ | 9·427 | 9½ | 30 |
| 30½ | 12·471 | 12½ | 11·305 | 11½ | 10·309 | 10½ | 9·454 | 9½ | 30½ |
| 31 | 12·532 | 12½ | 11·350 | 11 | 10·343 | 10 | 9·479 | 9½ | 31 |
| 31½ | 12·590 | 12½ | 11·393 | 11½ | 10·375 | 10½ | 9·503 | 9½ | 31½ |
| 32 | 12·647 | 12 | 11·435 | 11 | 10·406 | 10 | 9·526 | 9½ | 32 |
| 32½ | 12·701 | 12 | 11·475 | 11½ | 10·436 | 10½ | 9·548 | 9½ | 32½ |
| 33 | 12·754 | 12½ | 11·514 | 11½ | 10·464 | 10½ | 9·569 | 9½ | 33 |
| 33½ | 12·805 | 12½ | 11·551 | 11½ | 10·492 | 10½ | 9·589 | 9½ | 33½ |
| 34 | 12·854 | 12½ | 11·587 | 11½ | 10·518 | 10½ | 9·609 | 9½ | 34 |
| 34½ | 12·902 | 13 | 11·621 | 11½ | 10·543 | 10½ | 9·627 | 9½ | 34½ |
| 35 | 12·948 | 13 | 11·655 | 11 | 10·567 | 10½ | 9·644 | 9½ | 35 |
| 35½ | 12·992 | 13 | 11·686 | 11½ | 10·590 | 10½ | 9·661 | 9½ | 35½ |
| 36 | 13·035 | 13 | 11·717 | 11½ | 10·612 | 10½ | 9·677 | 9½ | 36 |
| 36½ | 13·077 | 13 | 11·747 | 11 | 10·633 | 10½ | 9·692 | 9½ | 36½ |
| 37 | 13·117 | 13 | 11·775 | 11½ | 10·653 | 10½ | 9·706 | 9½ | 37 |
| 37½ | 13·156 | 13½ | 11·803 | 11½ | 10·672 | 10½ | 9·720 | 9½ | 37½ |
| 38 | 13·193 | 13½ | 11·829 | 11½ | 10·691 | 10½ | 9·733 | 9½ | 38 |
| 38½ | 13·230 | 13½ | 11·854 | 11½ | 10·709 | 10½ | 9·745 | 9½ | 38½ |
| 39 | 13·265 | 13½ | 11·879 | 12 | 10·726 | 10 | 9·757 | 9½ | 39 |
| 39½ | 13·299 | 13½ | 11·902 | 12 | 10·742 | 10½ | 9·768 | 9½ | 39½ |
| 40 | 13·332 | 13½ | 11·925 | 12 | 10·757 | 10½ | 9·779 | 9½ | 40 |

248 DETERMINING AMORTIZATION OF LEASES, ETC.

TABLE FOR DETERMINING THE AMORTIZATION OF LEASES, &c.
Continued.

| Years. | Years Pur. 3 per Cent. | | Years Pur. 4 per Cent. | | Years Pur. 5 per Cent. | | Years Pur. 6 per Cent. | | Years. |
|--------|---------------------------|--------------------------------|---------------------------|--------------------------------|---------------------------|--------------------------------|---------------------------|--------------------------------|--------|
| 40½ | 23·265 | 23 ¹ / ₄ | 19·894 | 20 | 17·228 | 17 ¹ / ₄ | 15·093 | 15 | 40½ |
| 41 | 23·412 | 23 ¹ / ₂ | 19·993 | 20 | 17·294 | 17 ¹ / ₂ | 15·138 | 15 ¹ / ₄ | 41 |
| 41½ | 23·558 | 23 ³ / ₄ | 20·090 | 20 | 17·360 | 17 ³ / ₄ | 15·182 | 15 ¹ / ₂ | 41½ |
| 42 | 23·701 | 24 | 20·186 | 20 ¹ / ₄ | 17·423 | 17 ¹ / ₂ | 15·225 | 15 ¹ / ₄ | 42 |
| 42½ | 23·843 | 24 ¹ / ₄ | 20·279 | 20 ¹ / ₂ | 17·485 | 17 ³ / ₄ | 15·266 | 15 ¹ / ₂ | 42½ |
| 43 | 23·982 | 24 ¹ / ₂ | 20·371 | 20 ³ / ₄ | 17·546 | 17 ¹ / ₂ | 15·306 | 15 ¹ / ₄ | 43 |
| 43½ | 24·119 | 24 ³ / ₄ | 20·461 | 20 ¹ / ₂ | 17·605 | 17 ³ / ₄ | 15·345 | 15 ¹ / ₂ | 43½ |
| 44 | 24·254 | 25 | 20·549 | 20 ³ / ₄ | 17·663 | 17 ¹ / ₂ | 15·383 | 15 ¹ / ₄ | 44 |
| 44½ | 24·387 | 25 ¹ / ₄ | 20·635 | 20 ¹ / ₂ | 17·719 | 17 ³ / ₄ | 15·420 | 15 ¹ / ₂ | 44½ |
| 45 | 24·519 | 25 ¹ / ₂ | 20·720 | 20 ³ / ₄ | 17·774 | 17 ¹ / ₂ | 15·456 | 15 ¹ / ₄ | 45 |
| 45½ | 24·648 | 25 ³ / ₄ | 20·803 | 20 ¹ / ₂ | 17·828 | 17 ³ / ₄ | 15·491 | 15 ¹ / ₂ | 45½ |
| 46 | 24·775 | 26 | 20·885 | 21 | 17·880 | 18 | 15·524 | 15 ¹ / ₄ | 46 |
| 46½ | 24·901 | 25 ¹ / ₄ | 20·965 | 21 | 17·931 | 18 | 15·557 | 15 ¹ / ₂ | 46½ |
| 47 | 25·025 | 25 ¹ / ₂ | 21·043 | 21 | 17·981 | 18 | 15·589 | 15 ¹ / ₄ | 47 |
| 47½ | 25·147 | 25 ³ / ₄ | 21·120 | 21 | 18·030 | 18 | 15·620 | 15 ¹ / ₂ | 47½ |
| 48 | 25·267 | 25 ¹ / ₂ | 21·195 | 21 ¹ / ₄ | 18·077 | 18 | 15·650 | 15 ¹ / ₄ | 48 |
| 48½ | 25·385 | 25 ³ / ₄ | 21·269 | 21 ¹ / ₂ | 18·123 | 18 | 15·679 | 15 ¹ / ₂ | 48½ |
| 49 | 25·502 | 25 ¹ / ₂ | 21·341 | 21 ¹ / ₄ | 18·169 | 18 ¹ / ₄ | 15·708 | 15 ¹ / ₄ | 49 |
| 49½ | 25·617 | 25 ³ / ₄ | 21·413 | 21 ¹ / ₂ | 18·213 | 18 ¹ / ₂ | 15·735 | 15 ¹ / ₂ | 49½ |
| 50 | 25·730 | 25 ¹ / ₂ | 21·482 | 21 ¹ / ₂ | 18·256 | 18 ¹ / ₄ | 15·762 | 15 ¹ / ₄ | 50 |
| 51 | 25·951 | 26 | 21·617 | 21 ¹ / ₄ | 18·339 | 18 ¹ / ₄ | 15·813 | 15 ¹ / ₄ | 51 |
| 52 | 26·166 | 26 ¹ / ₄ | 21·748 | 21 ¹ / ₂ | 18·418 | 18 ¹ / ₂ | 15·861 | 15 ¹ / ₂ | 52 |
| 53 | 26·375 | 26 ¹ / ₂ | 21·873 | 21 ³ / ₄ | 18·493 | 18 ¹ / ₄ | 15·907 | 16 | 53 |
| 54 | 26·578 | 26 ³ / ₄ | 21·993 | 22 | 18·565 | 18 ¹ / ₂ | 15·950 | 16 | 54 |
| 55 | 26·774 | 26 ¹ / ₂ | 22·109 | 22 | 18·633 | 18 ³ / ₄ | 15·991 | 16 | 55 |
| 56 | 26·965 | 27 | 22·220 | 22 ¹ / ₄ | 18·699 | 18 ³ / ₄ | 16·029 | 16 | 56 |
| 57 | 27·151 | 27 ¹ / ₄ | 22·327 | 22 ¹ / ₂ | 18·761 | 18 ³ / ₄ | 16·065 | 16 | 57 |
| 58 | 27·331 | 27 ¹ / ₂ | 22·430 | 22 ³ / ₄ | 18·820 | 18 ³ / ₄ | 16·099 | 16 | 58 |
| 59 | 27·506 | 27 ³ / ₄ | 22·528 | 22 ¹ / ₂ | 18·876 | 19 | 16·131 | 16 ¹ / ₄ | 59 |
| 60 | 27·676 | 27 ¹ / ₂ | 22·623 | 22 ³ / ₄ | 18·929 | 19 | 16·161 | 16 ¹ / ₂ | 60 |
| 65 | 28·453 | 28 ¹ / ₂ | 23·047 | 23 | 19·161 | 19 ¹ / ₄ | 16·289 | 16 ¹ / ₄ | 65 |
| 70 | 29·123 | 29 | 23·395 | 23 ¹ / ₄ | 19·343 | 19 ¹ / ₄ | 16·385 | 16 ¹ / ₂ | 70 |
| 75 | 29·702 | 29 ³ / ₄ | 23·680 | 23 ¹ / ₂ | 19·485 | 19 ¹ / ₂ | 16·456 | 16 ¹ / ₄ | 75 |
| 80 | 30·201 | 30 ¹ / ₄ | 23·915 | 24 | 19·596 | 19 ¹ / ₂ | 16·509 | 16 ¹ / ₂ | 80 |
| 85 | 30·631 | 30 ¹ / ₂ | 24·109 | 24 | 19·684 | 19 ³ / ₄ | 16·549 | 16 ¹ / ₂ | 85 |
| 90 | 31·002 | 31 | 24·267 | 24 ¹ / ₄ | 19·752 | 19 ³ / ₄ | 16·579 | 16 ¹ / ₂ | 90 |
| 95 | 31·323 | 31 ¹ / ₄ | 24·398 | 24 ¹ / ₂ | 19·806 | 19 ³ / ₄ | 16·601 | 16 ¹ / ₂ | 95 |
| 100 | 31·599 | 31 ¹ / ₂ | 24·505 | 24 ³ / ₄ | 19·848 | 19 ³ / ₄ | 16·618 | 16 ¹ / ₂ | 100 |
| Perp. | 33·333 | 33 ¹ / ₃ | 25·000 | 25 | 20·000 | 20 | 16·667 | 16 ² / ₃ | Perp. |

TABLE FOR DETERMINING THE AMORTIZATION OF LEASES, &c.
Continued.

| Years. | Years Pur. 7 per Cent. | | Years Pur. 8 per Cent. | | Years Pur. 9 per Cent. | | Years Pur. 10 per Cent. | | Years. |
|------------------|---------------------------|------------------|---------------------------|------------------|---------------------------|------------------|----------------------------|-----------------|------------------|
| 40 $\frac{1}{2}$ | 13'363 | 13 $\frac{1}{4}$ | 11'946 | 12 | 10'772 | 10 $\frac{3}{4}$ | 9'789 | 9 $\frac{3}{4}$ | 40 $\frac{1}{2}$ |
| 41 | 13'394 | 13 $\frac{1}{4}$ | 11'967 | 12 | 10'787 | 10 $\frac{3}{4}$ | 9'799 | 9 $\frac{3}{4}$ | 41 |
| 41 $\frac{1}{2}$ | 13'424 | 13 $\frac{1}{4}$ | 11'987 | 12 | 10'800 | 10 $\frac{3}{4}$ | 9'808 | 9 $\frac{3}{4}$ | 41 $\frac{1}{2}$ |
| 42 | 13'452 | 13 $\frac{1}{4}$ | 12'007 | 12 | 10'813 | 10 $\frac{3}{4}$ | 9'817 | 9 $\frac{3}{4}$ | 42 |
| 42 $\frac{1}{2}$ | 13'480 | 13 $\frac{1}{4}$ | 12'025 | 12 | 10'826 | 10 $\frac{3}{4}$ | 9'826 | 9 $\frac{3}{4}$ | 42 $\frac{1}{2}$ |
| 43 | 13'507 | 13 $\frac{1}{4}$ | 12'043 | 12 | 10'838 | 10 $\frac{3}{4}$ | 9'834 | 9 $\frac{3}{4}$ | 43 |
| 43 $\frac{1}{2}$ | 13'533 | 13 $\frac{1}{4}$ | 12'060 | 12 | 10'849 | 10 $\frac{3}{4}$ | 9'842 | 9 $\frac{3}{4}$ | 43 $\frac{1}{2}$ |
| 44 | 13'558 | 13 $\frac{1}{4}$ | 12'077 | 12 | 10'861 | 10 $\frac{3}{4}$ | 9'849 | 9 $\frac{3}{4}$ | 44 |
| 44 $\frac{1}{2}$ | 13'582 | 13 $\frac{1}{4}$ | 12'093 | 12 | 10'871 | 10 $\frac{3}{4}$ | 9'856 | 9 $\frac{3}{4}$ | 44 $\frac{1}{2}$ |
| 45 | 13'606 | 13 $\frac{1}{4}$ | 12'108 | 12 | 10'881 | 11 | 9'863 | 9 $\frac{3}{4}$ | 45 |
| 45 $\frac{1}{2}$ | 13'628 | 13 $\frac{3}{4}$ | 12'123 | 12 | 10'891 | 11 | 9'869 | 9 $\frac{3}{4}$ | 45 $\frac{1}{2}$ |
| 46 | 13'650 | 13 $\frac{3}{4}$ | 12'137 | 12 $\frac{1}{4}$ | 10'900 | 11 | 9'875 | 10 | 46 |
| 46 $\frac{1}{2}$ | 13'671 | 13 $\frac{3}{4}$ | 12'151 | 12 $\frac{1}{4}$ | 10'909 | 11 | 9'881 | 10 | 46 $\frac{1}{2}$ |
| 47 | 13'692 | 13 $\frac{3}{4}$ | 12'164 | 12 $\frac{1}{4}$ | 10'918 | 11 | 9'887 | 10 | 47 |
| 47 $\frac{1}{2}$ | 13'711 | 13 $\frac{3}{4}$ | 12'177 | 12 $\frac{1}{4}$ | 10'926 | 11 | 9'892 | 10 | 47 $\frac{1}{2}$ |
| 48 | 13'730 | 13 $\frac{3}{4}$ | 12'189 | 12 $\frac{1}{4}$ | 10'934 | 11 | 9'897 | 10 | 48 |
| 48 $\frac{1}{2}$ | 13'749 | 13 $\frac{3}{4}$ | 12'201 | 12 $\frac{1}{4}$ | 10'941 | 11 | 9'902 | 10 | 48 $\frac{1}{2}$ |
| 49 | 13'767 | 13 $\frac{3}{4}$ | 12'212 | 12 $\frac{1}{4}$ | 10'948 | 11 | 9'906 | 10 | 49 |
| 49 $\frac{1}{2}$ | 13'784 | 13 $\frac{3}{4}$ | 12'223 | 12 $\frac{1}{4}$ | 10'955 | 11 | 9'911 | 10 | 49 $\frac{1}{2}$ |
| 50 | 13'801 | 13 $\frac{3}{4}$ | 12'233 | 12 $\frac{1}{4}$ | 10'962 | 11 | 9'915 | 10 | 50 |
| 51 | 13'832 | 13 $\frac{3}{4}$ | 12'253 | 12 $\frac{1}{4}$ | 10'974 | 11 | 9'921 | 10 | 51 |
| 52 | 13'862 | 13 $\frac{3}{4}$ | 12'272 | 12 $\frac{1}{4}$ | 10'985 | 11 | 9'930 | 10 | 52 |
| 53 | 13'890 | 14 | 12'288 | 12 $\frac{1}{4}$ | 10'996 | 11 | 9'936 | 10 | 53 |
| 54 | 13'916 | 14 | 12'304 | 12 $\frac{1}{4}$ | 11'005 | 11 | 9'942 | 10 | 54 |
| 55 | 13'940 | 14 | 12'319 | 12 $\frac{1}{4}$ | 11'014 | 11 | 9'947 | 10 | 55 |
| 56 | 13'963 | 14 | 12'332 | 12 $\frac{1}{4}$ | 11'022 | 11 | 9'952 | 10 | 56 |
| 57 | 13'984 | 14 | 12'344 | 12 $\frac{1}{4}$ | 11'029 | 11 | 9'956 | 10 | 57 |
| 58 | 14'003 | 14 | 12'356 | 12 $\frac{1}{4}$ | 11'036 | 11 | 9'960 | 10 | 58 |
| 59 | 14'022 | 14 | 12'367 | 12 $\frac{1}{4}$ | 11'042 | 11 | 9'964 | 10 | 59 |
| 60 | 14'039 | 14 | 12'377 | 12 $\frac{1}{4}$ | 11'048 | 11 | 9'967 | 10 | 60 |
| 65 | 14'110 | 14 | 12'416 | 12 $\frac{1}{2}$ | 11'070 | 11 | 9'980 | 10 | 65 |
| 70 | 14'160 | 14 $\frac{1}{4}$ | 12'443 | 12 $\frac{1}{2}$ | 11'084 | 11 | 9'987 | 10 | 70 |
| 75 | 14'196 | 14 $\frac{1}{4}$ | 12'461 | 12 $\frac{1}{2}$ | 11'094 | 11 | 9'992 | 10 | 75 |
| 80 | 14'222 | 14 $\frac{1}{4}$ | 12'474 | 12 $\frac{1}{2}$ | 11'100 | 11 | 9'995 | 10 | 80 |
| 85 | 14'240 | 14 $\frac{1}{4}$ | 12'482 | 12 $\frac{1}{2}$ | 11'104 | 11 | 9'997 | 10 | 85 |
| 90 | 14'253 | 14 $\frac{1}{4}$ | 12'488 | 12 $\frac{1}{2}$ | 11'106 | 11 | 9'998 | 10 | 90 |
| 95 | 14'263 | 14 $\frac{1}{4}$ | 12'492 | 12 $\frac{1}{2}$ | 11'108 | 11 | 9'999 | 10 | 95 |
| 100 | 14'269 | 14 $\frac{1}{4}$ | 12'494 | 12 $\frac{1}{2}$ | 11'109 | 11 | 9'999 | 10 | 100 |
| Perp. | 14'286 | 14 $\frac{1}{4}$ | 12'500 | 12 $\frac{1}{2}$ | 11'111 | 11 | 10'000 | 10 | Perp. |

EXAMPLES.

The foregoing Table is reproduced from the twenty-second edition of Inwood's "Tables for the Purchasing of Estates, etc.," by kind permission of the publishers, Messrs. Crosby Lockwood and Son, and shows the annual amounts to be debited to Profit and Loss Account, and credited to account of Lease or other object to be amortized in a given number of years with interest at 3, 4, 5, 6, 7, 8, 9, and 10 per cent. per annum. The table is also serviceable for ascertaining the value of a Lease at the several rates of interest.*

EXAMPLE:—A Lease or Annuity for 14 years, to make 3 per cent. and to get back the principal, is worth 11·296 or 11 $\frac{1}{4}$ years' purchase of the clear annual rent; at 4 per cent., 10·563, or 10 $\frac{1}{2}$ years' purchase; at 5 per cent., 9·899, or 10 years' purchase; at 6 per cent., 9·295, or 9 $\frac{1}{4}$ years' purchase. In calculating the value of Annuities, Leases, etc., *Compound* Interest is always reckoned and allowed.

A hypothetical Ledger Account, showing the amortization of a Lease at 5 per cent. per annum, will be found, with a description in Chapter VII.

* For other rates of interest than are shown in the Table here reproduced, the reader may be referred to the current edition of "Inwood's Tables" (London: Crosby Lockwood & Son), where a similar Table is given, but extended to many more rates of interest—16 in all: namely, 1 $\frac{1}{2}$, 1 $\frac{3}{4}$, 2, 2 $\frac{1}{4}$, 2 $\frac{1}{2}$, 2 $\frac{3}{4}$, 3, 3 $\frac{1}{2}$, 4, 4 $\frac{1}{2}$, 5, 6, 7, 8, 9, and 10 per cent.

GLOSSARY OF TERMS.

GLOSSARY OF SOME OF THE TERMS USED.

The definitions do not extend to terms used in quotations or in the Appendices.

- Amortization.**—The process by which provision is made for the expiration of value in an asset.
- Appreciation.**—The increase in value of assets either through special or general causes. (Opposed to Depreciation, *q. v.*)
- Assets.**—Property of all kinds, possessed or in reversion which can be applied in satisfaction of liabilities, or turned into money or money's worth. (Opposed to Liabilities, *q. v.*)
- Balance Sheet.**—A complete summary of debit and credit balances as they appear in the accounts in the Ledger at a given date.
- Book Value.**—The monetary value of any asset according to the books of account. (Distinguished from Market Value, *q. v.*)
- Capital.**—The money or properties invested in the business. Assets applied to production of further wealth, or assets used as a source of income, or set aside for the satisfaction of future needs.
- Cash Books.**—A commercial book recording the cash transactions.
- Commercial Books.**—The books pertaining to the counting-house, such as the Ledger, Journal, Cash Book, recording mercantile transactions, as distinguished from Factory Books treating of merchandise.
- Commercial Ledger.**—The Mercantile Ledger (as distinguished from the Stores, Stock, and Plant Ledgers).
- Cost Journal.**—The book in which adjusting entries as to cost are made.
- Cost Ledger—Cost Book.**—The book in which are collected all entries relating to prime cost, and to cost of production.
- Cost of Production.**—The total expenditure incurred in the production of a commodity.

- Counting-House.**—The place in which the mercantile book-keeping is conducted.
- Craft Register.**—The book recording the work done by, and the earnings of, each of the Craft.
- Credit Note.**—If received, an advice of indebtedness to the firm. If issued, an advice of indebtedness by the firm.
- Credit Note Register.**—A commercial book in which the credit notes received are registered.
- Day Book.**—A commercial book in which the sales of stock are recorded.
- Delivery Note.**—A request to receive, and a description of, material tendered.
- Depreciation.**—The falling off in the value of buildings, machinery, plant, and other assets. (Distinguished from Appreciation, *q. v.*)
- Dilapidations.**—Those defects in a tenement which have arisen from neglect or misuse; and of use or age, if the efficiency of the structure is destroyed.
- Establishment Expenses—General Charges.**—The general expenses which cannot be *directly* charged to any particular process or branch of a business.
- Estimate of Cost.**—A calculation of the probable cost of a commodity.
- Factory.**—The place in which manufacturing operations are carried on.
- Factory Accounts.**—The systematic registration for purposes of account of transactions appertaining to manufacture.
- Factory General Charges.**—The general expenses incurred in the factory which cannot be directly charged to any particular Order No.
- Factory Order.**—(*See* STOCK ORDER.)
- Factory General Charges Book.**—The book in which the Factory General Charges are collected.
- Fixed Capital.**—That part of the capital of a firm which consists of the instruments of production of a more or less permanent character, and the return from which is spread over a period of time.
- Fixed Plant.**—The machinery and appurtenances required for the purpose of manufacture, and permanently located in one position in a factory. (Distinguished from Loose Plant and Tools, *q. v.*)

- Foreman.**—A superintendent of a floor, wing, or shop in a factory, or of a set of men.
- Fuel Summary Form.**—A form summarising the various items of cost in the delivered price of fuel.
- General Charges.**—(See ESTABLISHMENT EXPENSES.)
- General Stores Account.**—The account in the Commercial Ledger in which the receipts and issues of stores, as recorded in the Commercial Books, are collected.
- Going Concern.**—A business the efficiency of which, for the purpose of profit, is maintained.
- Goodwill.**—The value pertaining to the *clientèle*, or interest in the business.
- Indirect Expenses.**—Outlays not directly remunerative. (Distinguished from General Charges and Establishment Expenses, *q. v.*)
- Indirect Factory Expenses.**—Outlays made in the factory which are not directly remunerative. (Distinguished from Factory General Charges.)
- Inventory.**—A detailed and descriptive catalogue of properties.
- Invoice.**—If received, an advice of indebtedness by the firm. If issued, an advice of indebtedness to the firm.
- Invoice Allocation (or Bought Day) Book.**—A commercial book in which invoices for goods purchased are entered and analysed.
- Invoice Register Book.**—A commercial book in which the invoices received are registered.
- Issue Notes.**—(See STORES WARRANTS.)
- Joint Stock Company.**—An association of individuals who combine by the subscription of capital to carry on a business.
- Labour.**—That factor in the cost of production which in a given trade represents the work of adapting materials either manually or by machinery.
- Leading Hand.**—The senior hand of a floor, wing, or shop in a factory, or of a gang of men.
- Liabilities.**—The debts and obligations of a firm. (Opposed to Assets, *q. v.*)
- Loose Plant and Tools.**—The machinery, tools, and appurtenances temporarily located in any position in a factory for the purpose of manufacture. (Distinguished from Fixed Plant, *q. v.*)
- Magazine.**—(See STORES.)
- Maintenance.**—The preservation of the efficiency of fixed capital.

Manufactory.—(See **FACTORY**.)

Manufacturing Account.—The Account in the Commercial Ledger which shows the value of the Stock Orders or goods in course of manufacture.

Manufacturing Order.—(See **STOCK ORDER**.)

Market Price.—The price at or about which all other similar commodities are being sold in the same place. (Distinguished from Book Value, *q. v.*)

Material—Stores.—That factor in the cost of production which represents the raw material of trade employed in the manufacture of commodities.

Obsolescence.—The process by which an article before it is worn out falls either wholly or in part into desuetude in a certain trade, and as a result is no longer of current application in that trade.

Order Form.—An instruction to a vendor to supply material or do work.

Orders Received Book.—A commercial book recording the orders received.

Outworks Time Record.—A form used by employes engaged outside the factory, showing how their time has been spent.

Overlooker.—A supervisor of labour.

Overtime.—Time worked beyond the normal period of employment in the factory.

Overtime Book.—A factory book in which the timekeeper records the overtime made.

Overtime Comparison Book.—A book in which comparison is made between the cost of ordinary time and overtime.

Overtime Return.—A return showing the overtime worked in the factory during a certain period.

Patents Account.—The account in the commercial books which records the book value of patents.

Patterns.—The types to and from which articles are made.

Petty Cash Book.—A commercial book recording small cash transactions.

Piece Work.—Work paid for by the piece or job. (Distinguished from work paid by time.)

Piece Work Analysis Book.—A book in which the piece work returns are analysed and a comparison instituted as to the relative value, as regards the product, of time and piece wages.

- Piece Work Return.**—A factory form used by employéés engaged on piece work.
- Plant.**—The machinery and appurtenances required for the purpose of manufacture. (*Vide* Fixed Capital, Fixed Plant, Loose Plant.)
- Plant and Buildings Ledger.**—A book in which are collected all entries relating to fixed and loose plant and buildings.
- Plant Debit Note.**—A factory form used to record the employment of plant.
- Plant Debit Summary.**—The form on which Plant Debit Notes are summarised.
- Prime Cost.**—The original or direct cost of an article.
- Production Order.**—(*See* STOCK ORDER.)
- Profit and Loss Account.**—The statement which shows the pecuniary result of the business effected. (Distinguished from Revenue, *q. v.*)
- Railway Rates Book.**—The book in which railway rates are recorded under the headings of the various charges making up the rate.
- Rate Book.**—(*See* WAGES RATE BOOK.)
- Raw Material.**—The unadapted materials employed in the production of commodities of a particular trade. The manufactured articles of one trade may be the raw materials of another.
- Renewal.**
- Renovation.** } (*See* MAINTENANCE.)
- Repairs.** }
- Reserve Fund.**—A provision for contingencies.
- Residual Value.**—The ultimate selling value of assets when worn out or superseded.
- Retail Warehouse.**—The repository for commodities which have been purchased from the makers or other vendors for reselling.
- Revenue.**—The gross return from capital employed. (Distinguished from Profit and Loss, *q. v.*)
- Sales Analysis Book.**—A commercial book in which an analysis is made of the sale of stock.
- Sales Cancelled Book.**—A commercial book in which the credit notes given to customers in respect of stock returned are entered.
- Scrap.**—The minimum value of articles, *i.e.* the price that may be depended on for waste material.

Shop Cost.—(*See* PRIME COST.)

Shop Returns Book.—A book in which are recorded the Stores Debit Notes.

Shop Work Order.—(*See* STOCK ORDER.)

Sinking Fund.—A fund invested in order to provide for an eventual loss or claim.

Stock—Stock-in-Trade.—Those commodities which, having been manufactured or purchased, are on hand for sale; manufactured commodities on hand; contingently, articles purchased for retailing. (Distinguished from Stores, *q. v.*)

Stock Account.—The account in the Commercial Ledger in which are summarised the monetary transactions relating to stock.

Stock Books.—Books relating to the receipt and issue of stock.

Stock Debit Note.—A factory form used to record the completion of articles manufactured for stock, and their transfer from the factory to the warehouse.

Stock Issued Book.—A factory book in which the stock requisitions are recorded.

Stock Ledger.—The book in which all entries relating to stock are collected. (Distinguished from Stores, Plant, and Commercial Ledgers.)

Stock Order.—The instruction to manufacture commodities for stock and to record the expenditure. (Distinguished from Working Order, *q. v.*)

Stock Order No.—The number given to a Stock Order. (Distinguished from Working Order No., *q. v.*)

Stock Received Book.—A factory book recording the receipts of stock.

Stock Requisition.—A form used to record the withdrawal of stock from the warehouse.

Stock Returned by Customers Analysis Book.—A commercial book in which the Stock Returned Debit Notes are analysed.

Stock Returned by Customers Book.—A factory book in which the Stock Returned Debit Notes are recorded.

Stock Returned Debit Note.—A factory form used to record the return of stock to the warehouse by customers.

Stock-taking.—(*See* SURVEY.)

Stock Uncompleted.—Articles in course of manufacture for stock.

Store.—The repository for stores.

- Stores.**—The raw material or partially completed articles employed in manufacture or for other purposes. (Distinguished from Stock, *q. v.*)
- Stores Account.**—(*See* GENERAL STORES ACCOUNT.)
- Stores Debit Note.**—A factory form recording the return to store of waste or surplus material.
- Stores Issued Book.**—A factory book in which the Stores Warrants are entered.
- Storekeeper.**—The officer in charge of stores. (Distinguished from Warehouseman, *q. v.*)
- Stores Ledger.**—The book in which all entries relating to stores are collected. (Distinguished from Stock, Plant, and Commercial Ledgers.)
- Stores Received Book.**—A factory book in which the invoices for goods purchased are entered.
- Stores Rejected Book.**—A factory book in which are recorded all the credit-notes received from vendors of goods returned.
- Stores Requisition.**—A requisition from the storekeeper for the purchase of material.
- Stores Requisition Book.**—The book in which stores requisitions are entered.
- Stores Warrant.**—A factory form used for the withdrawal of stores.
- Survey—Stock-taking.**—The process of taking an inventory and of examining the condition, etc. of properties. (*See* VALUATION.)
- Suspense Account.**—An impersonal account in the Commercial Ledger to which items in abeyance are charged.
- Symbolic Nomenclature.**—The designation by symbols of machines and parts.
- Time Allocation Book.**—The book in which the time records are entered, and in which their apportionment to the various orders is carried out.
- Time Book.**—A factory book used by the timekeeper to record the time made by the employés.
- Time Clerk.**—The clerk who enters the employés' records of time, and analyses the same under the various working orders.
- Timekeeper or Gatekeeper.**—The employé whose duty it is to record the time the other employés enter and leave the factory.
- Time Record.**—A factory form used by the employés, recording how their time has been spent.

- Time Sheet.**—A form used to record the time of lighters, barges, or boats on their journeys.
- Tools.**—Instruments or implements of production of a more or less permanent nature.
- Tool Order.**—An instruction (subsidiary to a Stock Order) to manufacture tools, and by means of which the cost of those to be used in the manufacture of a commodity is ascertained.
- Tool Order No.**—The number given to a Tool Order.
- Trading Account.**—The account in the Commercial Ledger which represents the trading transactions. The debit side of the account records the cost of stock issued, and the credit the proceeds of sales.
- Transfer Analysis Book.**—A commercial book analysing the transfer from stores to warehouse, and *vice versâ*.
- Transfer Book.**—A factory book used to record Transfer Notes.
- Transfer Note.**—A form employed to record transfer of commodities from store to warehouse, or *vice versâ*.
- Unclaimed Wages Book.**—The book in which are entered the names and wages of those employés who are not paid in regular course.
- Valuation.**—The process of ascertaining by examination and survey the present and prospective value of properties or the earning power of any asset.
- Viewer.**—The examiner of manufactured articles or parts.
- Wages.**—Payment for labour.
- Wages Account.**—The account in the Commercial Ledger in which are collected all the entries relating to wages.
- Wages Advice.**—The form used to record the engagement, or dismissal, or resignation of employés, any alteration in their rates, fines levied, or premiums allowed.
- Wages Book.**—The book which records the amounts payable to each employé.
- Wages Rate Book.**—The book in which the rates of wages paid to employés are entered.
- Wagon and Van Statement Form.**—The form on which the earnings of the wagons and vans are shown.
- Wagon Journey Repairs Book.**—The book recording the repairs done to wagons whilst on journeys.
- Warehouse.**—The repository for stock.
- Warehouseman.**—The custodian of the stock. (Distinguished from Storekeeper, *q. v.*)

Wear and Tear.—The gradual and normal deterioration of plant and buildings.

Working Order.—An instruction to expend labour and material in the maintenance, repair, and renewal of plant and buildings, and to record this expenditure. (Distinguished from Stock Order, *q. v.*)

Working Order No.—The number given to a Working Order.

Writing Down—Writing-off.—The process by which the book value of an article is reduced.

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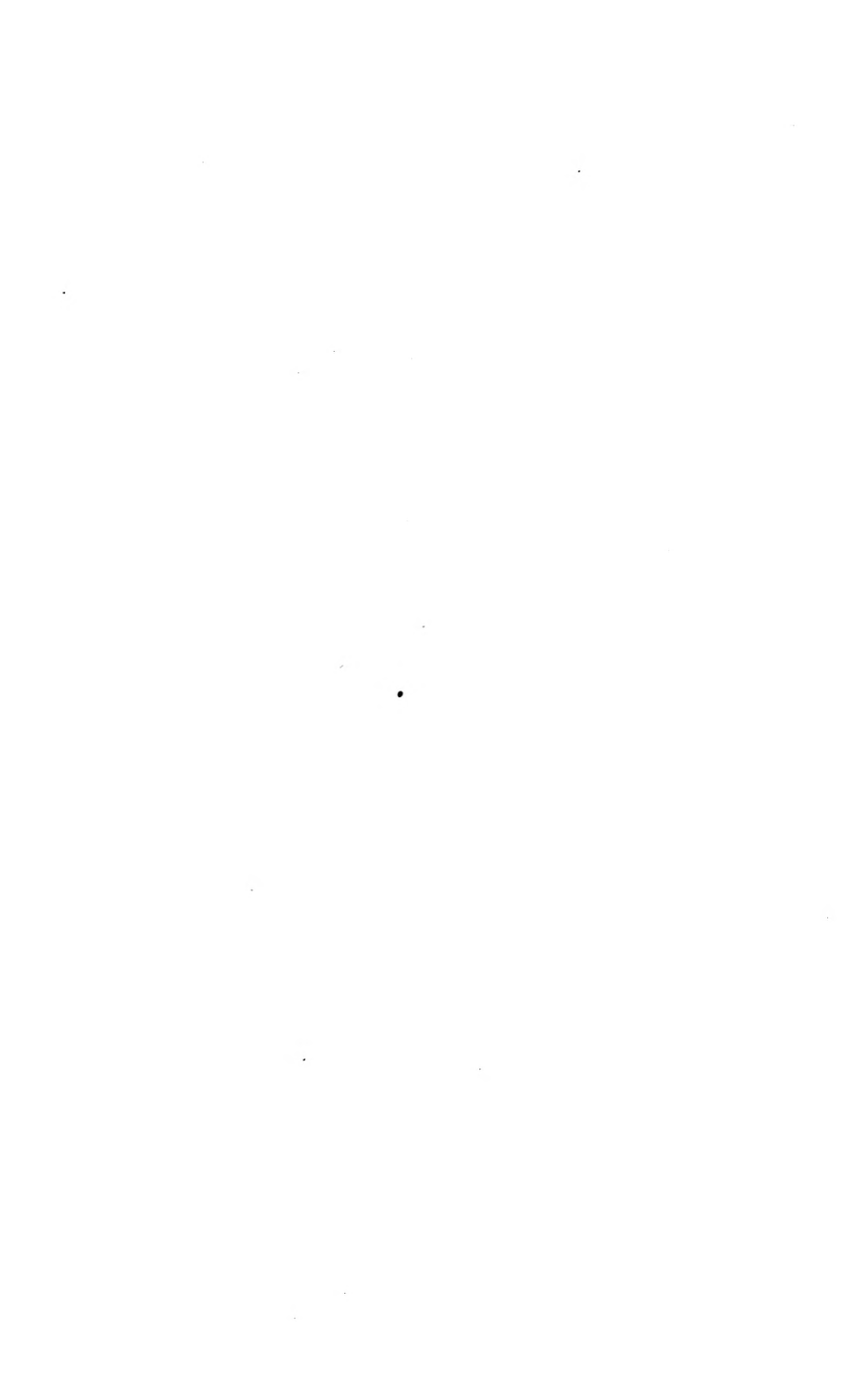
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